Chapter 1

Operation

Introduction 1-4
The Command Processor 1-4
  Normal Mode and Security Mode 1-4
  User Privilege Levels 1-7
  Remote Security Officer 1-9
  Entering Commands 1-9
  Aliases 1-10
  Online Help 1-10
  Storing and Retrieving Configuration Information 1-11
User Authentication Facility 1-12
  The User Authentication Database 1-13
  Asynchronous Port Security 1-17
  Telneting from the Router 1-18
  Counters 1-18
  Semipermanent Manager Port 1-19
RADIUS 1-19
TACACS 1-21
Remote Management 1-21
Monitoring and Fault Diagnosis 1-22
  Event Logging 1-22
  Restarts 1-22
  CPU Utilisation 1-22
  Memory 1-22
  Power Supply 1-23
Nonvolatile Storage (NVS) 1-24
FLASH Memory 1-24
  Physical Characteristics 1-25
The File Subsystem 1-25
  File Naming Conventions 1-25
  Using Wildcards to Specify Groups of Files 1-26
  Working With Files 1-27
FLASH File System 1-27
  Working with FFS Files 1-27
  Compaction 1-28
  FFS Messages 1-28
The Built-in Editor 1-28
HTTP Client and Server 1-29
  Resolving Uniform Resource Locators (URLs) 1-31
Mail Subsystem 1-31
  Configuration Examples 1-32
Software Releases and Patches 1-33

- Releases 1-33
- Patches 1-35
- Router Startup Operations 1-35
- Downloading Releases and Patches into the Router 1-37
- Install Information 1-38
- Examples 1-39

Special Feature Licences 1-42

Command Reference 1-43

- ACTIVATE FLASH COMPACTION 1-43
- ADD ALIAS 1-44
- ADD RADIUS SERVER 1-45
- ADD TACACS SERVER 1-46
- ADD USER 1-46
- ADD USER RSO 1-48
- CLEAR FLASH TOTALLY 1-49
- CREATE CONFIG 1-49
- CREATE FFILE 1-50
- DELETE ALIAS 1-51
- DELETE FFILE 1-52
- DELETE FILE 1-52
- DELETE INSTALL 1-53
- DELETE MAIL 1-54
- DELETE RADIUS SERVER 1-54
- DELETE TACACS SERVER 1-55
- DELETE USER 1-55
- DELETE USER RSO 1-56
- DESTROY PATCH 1-56
- DISABLE FEATURE 1-57
- DISABLE HTTP DEBUG 1-57
- DISABLE HTTP SERVER 1-58
- DISABLE MAIL DEBUG 1-58
- DISABLE RELEASE 1-59
- DISABLE SYSTEM SECURITY_MODE 1-59
- DISABLE USER 1-60
- DISABLE USER RSO 1-60
- DUMP 1-61
- EDIT 1-62
- ENABLE FEATURE 1-65
- ENABLE HTTP DEBUG 1-65
- ENABLE HTTP SERVER 1-66
- ENABLE MAIL DEBUG 1-66
- ENABLE RELEASE 1-67
- ENABLE SYSTEM SECURITY_MODE 1-68
- ENABLE USER 1-68
- ENABLE USER RSO 1-69
- HELP 1-69
- LOAD 1-70
- LOGIN 1-73
- LOGOFF 1-74
- MAIL 1-74
- MODIFY 1-75
- PURGE USER 1-76
- RENAME 1-76
- RESET HTTP SERVER 1-77
- RESET LOADER 1-77
- RESET USER 1-78
- RESTART 1-79
- SET CONFIG 1-80
- SET HELP 1-80

SET HTTP SERVER 1-81
SET INSTALL 1-82
SET LOADER 1-83
SET MAIL 1-85
SET MANAGER PORT 1-86
SET NVS CLEAR_TOTALLY 1-86
SET NVS CREATE 1-87
SET NVS DELETE 1-87
SET NVS MODIFY 1-88
SET PASSWORD 1-89
SET SYSTEM CONTACT 1-89
SET SYSTEM LOCATION 1-90
SET SYSTEM NAME 1-90
SET SYSTEM RPSMONITOR 1-91
SET SYSTEM TERRITORY 1-91
SET TIME 1-92
SET USER 1-93
SHOW ALIAS 1-95
SHOW BUFFER 1-96
SHOW CONFIG 1-98
SHOW CPU 1-100
SHOW DEBUG 1-101
SHOW EXCEPTION 1-103
SHOW FEATURE 1-104
SHOW FFILE 1-105
SHOW FILE 1-107
SHOW FLASH 1-108
SHOW FLASH PHYSICAL 1-109
SHOW HTTP CLIENT 1-110
SHOW HTTP DEBUG 1-111
SHOW HTTP SERVER 1-112
SHOW HTTP SESSION 1-113
SHOW INSTALL 1-114
SHOW LOADER 1-115
SHOW MAIL 1-116
SHOW MANAGER PORT 1-118
SHOW NVS 1-118
SHOW NVS DUMP 1-120
SHOW NVS FREE 1-121
SHOW PATCH 1-122
SHOW RADIUS 1-122
SHOW RELEASE 1-123
SHOW STARTUP 1-124
SHOW SYSTEM 1-124
SHOW TACACS SERVER 1-127
SHOW TIME 1-127
SHOW USER 1-128
SHOW USER RSO 1-132
UPLOAD 1-134

Introduction

This section describes the functions and commands available on the router to support day-to-day operational and network management activities.

The commands described in this section fall into six functional groups:

- The command processor and router configuration.
- The User Authentication Facility.
- Monitoring and fault diagnosis of the router and the network.
- Managing the nonvolatile storage (NVS).
- Managing FLASH memory and the FLASH File System (FFS).
- Downloading software releases and enhancements.

The Command Processor

The router is controlled and monitored with a set of commands which can be entered from a terminal connected to one of the asynchronous ports, or by using Telnet to connect to the router.

A user accessing the router from a terminal connected to an asynchronous port in secure mode, or via a Telnet connection, must enter a login name and password to gain access to the command prompt (see "*User Authentication Facility*" on page 1-12).

The command processor supports three levels of privilege, USER, MANAGER, and SECURITY OFFICER. USER and MANAGER privilege can be distinguished by the prompt displayed by the command processor when it is ready to receive commands. A USER level prompt looks like:

```
>
```

while a MANAGER prompt looks like:

```
Manager >
```

and a SECURITY OFFICER prompt looks like:

```
SecOff >
```

If the router's system name has been defined with the command:

```
SET SYSTEM NAME=name
```

then the system name is included in the prompt. The MANAGER level prompt for a router with the system name `ho.noname.com` looks like:

```
Manager ho.noname.com>
```

Normal Mode and Security Mode

The commands that a user may execute depend on the user's privilege level and the mode in which the router is operating. The router operates in one of two modes, *normal mode* and *security mode*. By default the router operates in normal mode. Security mode is designed to provide additional protection to routers fitted with encryption hardware or configured to provide sensitive security functions such as IP authentication, Secure Shell (see *Chapter 32, Secure Shell*), encryption (*Chapter 15, Compression and Encryption Services*) or IPsec (*Chapter 34, IP Security (IPsec)*). Security mode is enabled using the command:

```
ENABLE SYSTEM SECURITY_MODE
```

which also creates a security mode enabler file in the router's file subsystem. This file can not be manually modified, displayed, deleted, copied or renamed. If the router is restarted, the startup process checks for the presence of the enabler file. If the enabler file is present the router boots up in security mode, otherwise the router boots up in normal mode. The router is restored to normal operating mode using the command:

```
DISABLE SYSTEM SECURITY_MODE
```

which also deletes the security mode enabler file in the router's file subsystem. Sensitive data files, such as encryption keys, can only be stored in the router's file subsystem when the router is operating in security mode.

When security mode is disabled, all sensitive data files are automatically deleted.

The current operating mode is displayed using the command:

```
SHOW SYSTEM
```

When the router is operating in security mode, only users with SECURITY OFFICER privilege (see "*User Privilege Levels*" on page 1-7) can execute commands which could impact the security of the router and it's keys (Table 1-1 on page 1-5).

Table 1-1: Commands requiring SECURITY OFFICER privilege when the router is operating in security mode.

Command	Specific Parameters
ACTIVATE IPSEC	
ACTIVATE SCR	
ADD FR DLC	ENCRYPTION
ADD IP INT	
ADD IP SA	
ADD SA	
ADD SCR	
ADD SSH	
ADD USER	
CLEAR NVS	
CREATE CONFIG	
CREATE ENCO KEY	
CREATE FR	DEFENCRYPTION
CREATE IPSEC	
CREATE ISAKMP	
CREATE PPP	
CREATE PPP TEMPLATE	
CREATE SA	

Table 1-1: Commands requiring SECURITY OFFICER privilege when the router is operating in security mode. (Continued)

Command	Specific Parameters
CREATE SNMP COMMUNITY	
CREATE STAR	
DEACTIVATE SCR	
DELETE FILE	
DELELTE IP SA	
DELETE NVS	
DELETE SA	
DELETE SCR	
DELETE SSH	
DELETE USER	
DESTROY ENCO KEY	
DESTROY IPSEC	
DESTROY ISAKMP	
DESTROY SA	
DESTROY STAR	
DISABLE FEATURE	
DISABLE IPSEC	
DISABLE ISAKMP	
DISABLE SA	
DISABLE SSH	
DISABLE USER	
DUMP	
EDIT	
ENABLE FEATURE	
ENABLE IPSEC	
ENABLE ISAKMP	
ENABLE PPP DEBUG	
ENABLE PPP TEMPLATE DEBUG	
ENABLE SA	
ENABLE SNMP	
ENABLE SSH	
ENABLE STAR	MKTTRANSFER
ENABLE USER	
LOAD	
MAIL	
MODIFY	
PURGE IPSEC	
PURGE USER	
RENAME FILE	
RESET ENCO	

Table 1-1: Commands requiring SECURITY OFFICER privilege when the router is operating in security mode. (Continued)

Command	Specific Parameters
RESET IPSEC	
RESET USER	
SET CONFIG	
SET ENCO KEY	
SET FR	ENCRYPTION, DEFENCRYPTION
SET INSTALL	
SET IP INT	
SET IPSEC	
SET PPP	
SET PPP TEMPLATE	
SET SA	
SET SCR	
SET SNMP COMMUNITY	
SET SSH	
SET STAR	
SET USER	
SHOW CONFIG	
SHOW ENCO KEY	
SHOW FEATURE	
SHOW FILE	
SHOW NVS	
SHOW PPP	CONFIG
SHOW STAR	[=id], MKTTRANSFER, NETKEY
UPLOAD	

User Privilege Levels

The router supports three levels of privilege for users: USER (lowest), MANAGER and SECURITY OFFICER (highest). The commands that can be executed by a user depend on the user's privilege level and whether the router is operating in normal or security mode:

The USER level has access to a very limited subset of commands, regardless of whether the router is operating in normal or security mode. USER level commands only affect the user's own session or asynchronous port. USER privilege applies to a user who has not logged in (i.e. is using a terminal connected to an asynchronous port that is **not** in secure mode), or a user who has logged in to a username with USER privilege.

The MANAGER level has access to the full set of commands when the router is in normal mode. When the router is operating in security mode, users with MANAGER privilege can not execute a subset of the commands known as the security commands. MANAGER privilege can be gained in one of two ways:

- Using the command:

  ```
  LOGIN
  ```

  from any port or Telnet session to login under a login name that has MANAGER privilege. The command prompts for a login name and password. The password is case-sensitive and must be entered exactly as defined. If the password is entered correctly, the port or Telnet connection gains MANAGER privilege and the prompt changes to the MANAGER level prompt. This is the usual method of gaining MANAGER privilege, especially when managing remote routers.

- Using the command:

  ```
  SET MANAGER PORT
  ```

  to set a particular port as a semipermanent MANAGER port. Any terminal connected to the specified port will have MANAGER privilege. The SET MANAGER PORT command on page 1-86 is a MANAGER level command and can only be entered from a port or a Telnet session that already has MANAGER privilege. Only one port at a time can be defined as manager port.

To return to USER mode, use the command:

```
LOGOFF
```

Normally, the prompt changes when the user's privilege level changes from USER to MANAGER or vice versa. The prompt will not change if commands are being entered from a terminal connected to a physical port and the port's PROMPT parameter has been changed to a user-defined string with the SET PORT command on page 2-32 of Chapter 2, Interfaces.

The SECURITY OFFICER level has access to the full set of commands regardless of whether the router is operating in normal mode or security mode. When the router is operating in security mode, only users with SECURITY OFFICER privilege can execute security commands (see Table 1-1 on page 1-5). When the router is operating in normal mode MANAGER privilege is equivalent to SECURITY OFFICER privilege. A user can only log in under a login name that has SECURITY OFFICER privilege from either a terminal directly connected to an asynchronous port on the router or a Telnet session originating from an authorised IP address (see "*Remote Security Officer*" on page 1-9).

A security timer operates while a user is logged in with SECURITY OFFICER privilege, to minimise the risk of unauthorised access to an un-attended terminal or Telnet session. Every time a security command is entered, the security timer is restarted. If the timer expires the user's privilege is reset to MANAGER level, but the user remains logged in. Any attempt to execute a security command will require the user to re-enter the SECURITY OFFICER password. The timeout period, in seconds, can be configured using the command:

```
SET USER SECUREDELAY=10..600
```

Remote Security Officer

The *Remote Security Officer* (RSO) feature enables a remote user to connect to a router via Telnet from an authorised IP address, and login using a login name with SECURITY OFFICER privilege as if the user were at a terminal connected directly to the router. By default the Remote Security Officer feature is disabled.

The RSO feature can be enabled or disabled using the commands:

```
ENABLE USER RSO
DISABLE USER RSO
```

Authorised IP addresses can added or deleted with the command:

```
ADD USER RSO IP=ipadd [MASK=ipadd]
DELETE USER RSO IP=ipadd
```

The MASK parameter allows a range of IP addresses to be added. The current state of the RSO feature and the list of authorised IP addresses can be displayed using the command:

```
SHOW USER RSO
```

All RSO commands require SECURITY OFFICER privilege and therefore must be executed from a terminal directly attached to the router or from a Telnet session originating from a previously configured RSO address. RSO must be enabled, and the first address added, from a terminal directly attached to the router. If RSO is disabled (either from a terminal or a Telnet session) it can only be re-enabled from a terminal directly attached to the router.

Once RSO has been enabled and configured with one or more IP addresses, a Telnet session from one of the authorised addresses will be able to login as a user with SECURITY OFFICER privilege.

Entering Commands

The router supports command line editing and recall. The functions available are:

- Move the cursor backwards and forwards in the command line, using the cursor keys.
- Move the cursor to either end of the command line with a single keystroke.
- Insert and delete characters.
- Clear the command line.
- Toggle between insert and overstrike editing modes.
- Recall, edit and execute previous commands.
- Move backwards and forwards through a history of previous commands.
- Display a command history and select a command from the list.
- Clear the command history.
- Recall the most recent command matching a partially entered command.

Table 1-2 on page 1-10 lists the functions and the terminal keys or key combinations used to access these functions.

Table 1-2: Command line editing functions and keystrokes.

Function	VT100 Terminal	Dumb terminal
Move cursor within command line	←, →	*Not available*
Delete character to left of cursor	[Delete] or [Backspace]	[Delete] or [Backspace]
Toggle between insert/overstrike	[Ctrl/O]	*Not available*
Clear command line	[Ctrl/U]	[Ctrl/U]
Recall previous command	↑ or [Ctrl/B]	[Ctrl/B]
Recall next command	↓ or [Ctrl/F]	[Ctrl/F]
Display command history	[Ctrl/C] or SHOW PORT HISTORY	[Ctrl/C] or SHOW PORT HISTORY
Clear command history	RESET PORT HISTORY	RESET PORT HISTORY
Recall matching command	[Tab] or [Ctrl/I]	[Tab] or [Ctrl/I]

The router assumes that the width of the terminal screen is 80 characters, and performs command line wrapping at the 80th column regardless of the setting of the terminal. The cursor does not need to be at the end of the line for the command to be executed. The default editing mode is insert mode. Characters are inserted at the cursor position and any characters to the right of the cursor are pushed to the right to make room. In overstrike mode, characters are inserted at the cursor position and replace any existing characters.

Aliases

The command line interface supports aliases. An alias is a short name for an often-used longer character sequence. When the user presses [Enter] to execute the command line, the command processor first checks the command line for aliases and substitutes the replacement text. The command line is then parsed and processed normally. Alias substitution is not recursive—the command line is scanned only once for aliases.

Aliases are created and destroyed using the commands:

```
ADD ALIAS=name STRING=substitution

DELETE ALIAS=name
```

A list of all the aliases defined on the router and their replacement strings can be displayed using the command:

```
SHOW ALIAS
```

Online Help

Online help is available for all router commands. Typing a question mark "?" at the end of a partially completed command displays a list of the parameters that may follow the current command line, with the minimum abbreviations in uppercase letters (Figure 1-1 on page 1-11). The current command line is then re-displayed, ready for further input.

Figure 1-1: Using the question mark character (“?”) to display help for the current command.

```
Manager > ADD ?

  Options : ACC APPletalk BOOTp BRIDge DECnet FRamerelay GRE IP IPX ISDN
    LAPD LOG MIOX NTP OSPF PERM PPP RADius SA SCript SNmp STReam STT TRGger
    TACacs USEr X25C X25T TDM

Manager > ADD ACC ?

  Options : CALL SCript DOmainname

Manager > ADD ACC CALL ?

  Options : DIrection DScript CScript RScript POrt ENcapsulation AUthentication
    DOmainname
```

A multilingual, language-independent online help facility provides more detailed help information via the command:

```
HELP [topic]
```

If a topic is not specified, a list of available topics is displayed. The HELP command on page 1-69 displays information from the system help file stored in either NVS or FLASH memory. The help file uses a simple mark-up language to identify topics, access level (USER or MANAGER) and help text. Both standard ASCII and Unicode character encodings are supported. Alternate help files can be uploaded and stored in either NVS or FLASH, then activated using the command:

```
SET HELP=helpfile
```

The current help file can be displayed with the command:

```
SHOW SYSTEM
```

The help file is easily modified, for example to provide detailed site-specific support information. The mark-up language specification and preprocessor program are available from your distributor or reseller.

Storing and Retrieving Configuration Information

At boot the router executes the commands in the boot script to configure the router. The default boot script is called `boot.cfg`, but an alternative script file can be defined as the boot script using the command:

```
SET CONFIG=filename
```

Subsequent commands entered from the command line or executed from a script affect only the dynamic configuration in memory, which is not retained over a power cycle. Changes are not automatically stored in nonvolatile memory. When the router is restarted the configuration will be restored to that defined by the boot script, or if the router was restarted using the RESTART command on page 1-79, any script specified in the RESTART command.

To ensure that any configuration changes made after boot are retained across a restart or power cycle, the modified configuration must be saved as a script file, using the command:

```
CREATE CONFIG=filename
```

The CREATE CONFIG command on page 1-49 writes the MD5 digest, not the cleartext, of passwords in commands to the configuration file. When a configuration script is executed the command processor can determine whether the password value is cleartext or an MD5 digest.

If the file name specified is `boot.cfg`, or the file is set as the boot script using the SET CONFIG command on page 1-80, the modified configuration will automatically be restored after a restart or power cycle. If another name is specified, the configuration can be restored after a restart or power cycle using the command:

```
ACTIVATE SCRIPT=filename
```

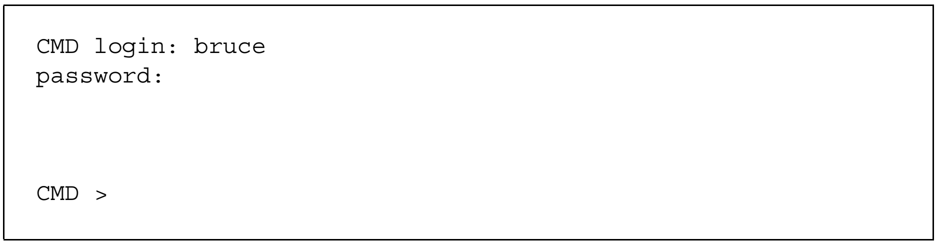
User Authentication Facility

The *User Authentication Facility* (UAF) controls access to the router's command prompt, asynchronous services and dialup services via a login name and password. A user will be prompted to enter a login name and password when:

- The user attempts to access the router's command prompt via a terminal connected directly to an asynchronous port set to SECURE mode.
- The user attempts to access the router's command prompt via a Telnet connection.
- The user attempts to access a dialup service via an asynchronous modem connected to an asynchronous port.
- The user enters the LOGIN command on page 1-73.

The UAF prompts the user for a login name and password (Figure 1-2 on page 1-12). The user must enter appropriate responses, pressing [Return] after each response. Characters entered at the password prompt are not echoed to the screen, for security reasons.

Figure 1-2: A typical login session for user BRUCE on router CMD.



```
CMD login: bruce
password:



CMD >
```

If the user enters an invalid login name or password, the sequence is repeated a set number of times. If a valid login name and password has still not been entered the terminal or Telnet session is *locked out* for a period of time. During this period the password prompt is withheld, preventing the user from logging in or entering commands. The manager can specify the number of login attempts allowed and the length of the lockout period.

The password prompt is displayed regardless of whether or not a password is required for the login name entered by the user. This makes it more difficult for an intruder to discover valid login name/password combinations.

The users authenticated by the UAF can be operators or other routers. If the user is another router, the authentication will occur without appearing in a terminal screen.

The UAF supports three methods of user authentication, an internal database called the *User Authentication Database*, and interrogation of external RADIUS (*Remote Authentication Dial In User Service*) or TACACS (*Terminal Access Controller Access System*) servers.

The UAF first queries the User Authentication Database. If the supplied login name and password does not match an entry in the User Authentication Database, the UAF sends authentication requests to any RADIUS servers that have been defined. If there are no defined RADIUS servers or all the RADIUS servers return a *reject* response, the UAF will send authentication requests to any TACACS servers that have been defined. If the supplied login name and password matches an entry in the User Authentication Database, or one of the defined RADIUS or TACACS servers returns an *accept* response to an authentication request, the login is accepted. If the supplied login name and password does not match an entry in the User Authentication Database, and all of the defined RADIUS or TACACS servers return *reject* responses to authentication requests, the login is rejected.

The User Authentication Database

The User Authentication Database stores information about the users who are permitted to have access to the router’s command prompt, asynchronous services and dialup services. Users are identified by a login name. Each login name has an associated record in the database which specifies:

- The password that the user must enter to login to the router.
- The privilege level for the user: USER, MANAGER or SECURITY OFFICER.
- Whether or not the user is permitted to use the TELNET command on page 11-24 of *Chapter 11, Terminal Server*, or to connect to a Telnet service from a Telnet session.
- The IP address, network mask and MTU (Maximum Transmission Unit) to use for PPP or SLIP connections to the router via an asynchronous port.
- A callback number for use with the PPP callback facility.

Adding Entries to the User Authentication Database

When the router is started up for the first time one account is created automatically. This account has the login name MANAGER, the password “friend”, and MANAGER privilege. This account can not be deleted, although the password may be changed. The MANAGER account makes the MANAGE command (supported in Release 6.6 and earlier) obsolete.

The manager should change the password of the MANAGER account at the earliest opportunity. Leaving the MANAGER account with the default password is a security risk, as the account name and default password are well documented.

Additional users can be added to the User Authentication Database using the command:

```
ADD USER=login-name PASSWORD=password [CALLINGNUMBER=number]
    [CBNUMBER=e164number] [DESCRIPTION=description]
    [PRIVILEGE={USER|MANAGER|SECURITYOFFICER}] [TELNET={YES|
    NO}] [IPADDRESS=ipadd] [IPXNETWORK=network]
    [NETMASK=ipadd] [MTU=40..1500]
```

The number of entries in the database is limited only by the amount of memory available. Only the login name and password must be specified. The default privilege level is USER. Other information about a user that may be specified includes a description for the entry (e.g. the user's full name), the privilege level, whether or not the user is permitted to use the TELNET command on page 11-24 of *Chapter 11, Terminal Server* or connect to a Telnet service, an IP number, network mask and MTU (Maximum Transmission Unit). The IP number, network mask and MTU are only required if the user is to run asynchronous PPP or SLIP over an asynchronous modem connected to an asynchronous port. The callback number is only required if the user is to make a PPP callback request with user authentication. See *Chapter 3, Point-to-Point Protocol (PPP)* for more information. The calling number is only used for L2TP and ISDN services that provide caller ID information.

Modifying Entries in the User Authentication Database

An entry in the database can be modified with the command:

```
SET USER=login-name [PASSWORD=password]
    [CALLINGNUMBER=number] [CBNUMBER=e164number]
    [DESCRIPTION=description] [PRIVILEGE={USER|MANAGER|
    SECURITYOFFICER}] [TELNET={YES|NO}] [IPADDRESS=ipadd]
    [IPXNETWORK=network] [NETMASK=ipadd] [MTU=40..1500]
```

An entry in the database can be deleted using the command:

```
DELETE USER=login-name
```

All entries in the database, except the MANAGER account, can be deleted with the command:

```
PURGE USER
```

The contents of the database can be displayed with the command:

```
SHOW USER[=login-name]
```

Passwords

All users, including managers, should take care in selecting passwords. Tools exist that enable hackers to guess or test many combinations of login names and passwords easily. The UAF provides some protection against such attacks by allowing the manager to set the number of consecutive login failures allowed and a lockout period when the limit is exceeded.

However, the best protection against password discovery is to select a good password, and keep it secret. When choosing a password:

- Do make it six or more characters in length. The UAF enforces a minimum password length, which can be changed by the manager. The default is six characters.
- Do include both alphabetic (a–z) and numeric (0–9) characters.

- Do include both uppercase and lowercase characters. The passwords stored by the router are case-sensitive, so “bgz4kal” and “Bgz4Kal” are different.
- Do avoid words found in a dictionary, unless combined with other random alphabetic and numeric characters.
- **Do not** use the login name, or the word “password” as the password.
- **Do not** use your name, your mothers name, your spouses name, your pets name, or the name of your favourite cologne, actor, food or song.
- **Do not** use your birth date, street number or telephone number.
- **Do not** write down your password anywhere.

A manager can alter the password for any user with the command:

```
SET USER=username PASSWORD=password
```

This may be necessary if the user has forgotten the password. A log message is generated whenever the password for a manager account is changed.

A user who is logged in can change their own password using the command:

```
SET PASSWORD
```

which prompts for the old password, the new password and confirmation of the new password. The new password and the confirmation must be identical for the change to take affect. This reduces the chances of a typing error causing the password to be different from what the user intended.

Database Security

A manager session that is left unattended is a severe security risk. In particular, the User Authentication Database can be modified from a manager session. To reduce the risk of unauthorised activity, a subset of manager commands (Table 1-3 on page 1-16), called the *security commands*, have a *security timer*. When one of the security commands is entered from a manager session, the security timer is started. Each time a security command is entered the timer is restarted. If a security command is entered after the timer has expired, the manager is prompted to re-enter the password correctly before the command will be actioned. If the password is not entered correctly the password prompt will be repeated a set number of times, and if the correct password is still not entered a log message is generated and the session is logged off.

The security timer enables a manager to make successive additions and modifications to the database at one time without having to re-enter the password for every command.

⚠ ***The security timer does not provide a foolproof security mechanism. Managers should always attempt to log out of a manager session before leaving a terminal unattended.***

Table 1-3: Secure commands controlled by the security timer.

Command	Description
ADD TACACS SERVER	Adds a TACACS server to the list of TACACS servers used for user authentication.
ADD USER	Adds a user to the User Authentication Database.
DELETE TACACS SERVER	Deletes a TACACS server from the list of TACACS servers used for user authentication.
DELETE USER	Deletes a user from the User Authentication Database.
PURGE USER	Deletes all users except MANAGER from the User Authentication Database.
SET MANAGER PORT	Assigns a port semipermanent MANAGER privilege.
SET USER	Modifies a user record in the User Authentication Database.

☞ *If the router is operating in security mode, the manager must also be logged in to a user account with SECURITY OFFICER privilege in order to execute any of the commands listed in Table 1-3 on page 1-16.*

Logging In and Logging Out

A user will automatically be prompted to enter a login name and password when attempting to access the router via Telnet or a terminal connected to an asynchronous port set to SECURE mode, or when attempting to access a dialup service via an asynchronous modem connected to an asynchronous port.

There are other occasions when a user may wish to login manually. A user on a terminal connected to an asynchronous port that is not in SECURE mode may wish to login in order to use facilities that are only available to logged in users, such as the TELNET command on page 11-24 of *Chapter 11, Terminal Server*. A user who is already logged in may wish to temporarily login as another user in order to acquire different rights, such as MANAGER privilege.

To log in to the router manually, use one of the commands:

```
LOGIN
LOGON
LOGI
```

which are synonyms. To log out of a session, use one of the commands:

```
LOGOFF
LOGOUT
LO
```

which are synonyms.

☞ *If a user Telnets to the router but does not attempt to login within one minute, the router automatically times out the session and terminates the Telnet connection.*

Recovering Lost Passwords

If a user forgets their password, the password can be reset from an account with MANAGER privilege, using the command:

```
SET USER=login-name PASSWORD=password
```

Passwords for accounts with MANAGER privilege can be reset with the same command, provided the manager can login to at least one account with MANAGER privilege. However, in the event that all manager account passwords are forgotten, the password for the MANAGER account can be reset to the default password “friend” using the following procedure:

1. Switch the router off at the power supply and remove the router lid.
2. Set switch 3 of the DIP switch package on the CPU board to “ON”. See the relevant section of *Appendix A, Hardware* for the specific router model.
3. Restart the router. The router will not become operational but as the startup sequence completes the MANAGER account is restored to its default settings and a startup message is displayed to this effect.
4. Switch the router off at the power supply.
5. Set switch 3 of the DIP switch package on the CPU board to “OFF”. See the relevant section of *Appendix A, Hardware* for the specific router model.
6. Replace the lid and restart the router. After the startup sequence the router will become operational with the MANAGER account restored to its default settings.

Asynchronous Port Security

Asynchronous ports may be set to SECURE mode, using the command:

```
SET PORT SECURE=ON
```

See *Chapter 2, Interfaces* for a detailed description of the SET PORT command on page 2-32 of *Chapter 2, Interfaces*. By default, all asynchronous ports are set to SECURE mode. Telnet sessions are always in SECURE mode. A user accessing the router via a terminal connected to an asynchronous port in SECURE mode, or via Telnet, must login before the router will accept any other commands. When a user Telnets to a router the login and password prompts are always displayed. The password prompt is displayed even if the login name does not match an entry in the User Authentication Database, to make it more difficult for an intruder to discover a valid login name. When a login name and password is entered that does not match an entry in the database, and is not accepted by any defined TACACS servers, the login sequence is repeated. If successive login failures occur, the login prompt is withheld for a specified *lockout period*. This makes it much more difficult for an intruder to randomly try login names and passwords hoping to gain entry. A log message is generated when the number of retries for a connection is exceeded and the lockout period is instigated. Telnet logins from an offending IP address are also locked out for this period once the permitted number of failures is exceeded. The number of login attempts permitted and the length of the lockout period can be configured with the command:

```
SET USER [LOGINFAIL=1..10] [LOCKOUTPD=0..30000]
```

Telneting from the Router

The router provides three modes of access to host services:

- Using the CONNECT command on page 11-13 of *Chapter 11, Terminal Server* to access asynchronous services. These are typically hosts connected directly to asynchronous ports on the router and defined as services using the SET SERVICE command on page 11-17 of *Chapter 11, Terminal Server*.
- Using the CONNECT command on page 11-13 of *Chapter 11, Terminal Server* to access Telnet services. These are typically Telnet hosts defined as services using the SET SERVICE command on page 11-17 of *Chapter 11, Terminal Server*.
- Using the TELNET command on page 11-24 of *Chapter 11, Terminal Server* to access Telnet hosts.

Each entry in the database has a TELNET attribute, which determines which modes of access the user is permitted to use.

All users can use the CONNECT command on page 11-13 of *Chapter 11, Terminal Server* to access asynchronous services, although users accessing the router via Telnet or a terminal attached to an asynchronous port in SECURE mode must login first to gain access to the command prompt.

Users logged into the router via a terminal attached to an asynchronous port can also use the CONNECT command on page 11-13 of *Chapter 11, Terminal Server* to access Telnet services. In addition, if the user is logged in to an account with the TELNET attribute set to "ON" the user can use the TELNET command on page 11-24 of *Chapter 11, Terminal Server* to Telnet to remote hosts.

Users logged into the router via Telnet can, by default, only use the CONNECT command on page 11-13 of *Chapter 11, Terminal Server* to access asynchronous services. If the user is logged in to an account with the TELNET attribute set to "ON" the user can also use the CONNECT command on page 11-13 of *Chapter 11, Terminal Server* to access Telnet services and the TELNET command on page 11-24 of *Chapter 11, Terminal Server* to Telnet to remote hosts.

A manager can use the TELNET attribute to allow users connected to the router via a terminal to access a restricted set of Telnet hosts, by defining those hosts as Telnet services (see the description of the SET SERVICE command on page 11-17 of *Chapter 11, Terminal Server* and setting the TELNET attribute to "OFF" for selected accounts. Users logged in to one of these accounts can use the CONNECT command on page 11-13 of *Chapter 11, Terminal Server* to access the Telnet services but can not use the TELNET command on page 11-24 of *Chapter 11, Terminal Server* to access any other Telnet hosts.

Counters

A number of counters record activity associated with the User Authentication Database. Counters relating to specific users in the database can be displayed with the command:

```
SHOW USER[=login-name]
```

Global counters and configuration parameters can be displayed with the command:

```
SHOW USER CONFIGURATION
```

All counters are stored in nonvolatile storage so that they are retained across router reboots and power cycles.

The counters for a specific user can be reset to zero using the command:

```
RESET USER=login-name
```

The counters for all users, the global counters, or all counters can be reset to zero with the command:

```
RESET USER COUNTER={USER|GLOBAL|ALL}
```

Semipermanent Manager Port

It is sometimes desirable to have an asynchronous port that has MANAGER privilege after a router reboot, without a manager having to log on. An asynchronous port can be set to default to MANAGER privilege using the command:

```
SET MANAGER PORT=port-number
```

Only one port may be a semipermanent manager port. By default, no semipermanent manager port is defined. This command is defined as one of the security commands (see "*Database Security*" on page 1-15).

When the router boots with a semipermanent manager port configured, the MANAGER account is automatically logged in to the port. The port has full MANAGER privilege and there is no restriction on Telneting from the port. The security timer is reset so that the first time a security command is entered the user will be challenged for the password for the MANAGER account.

RADIUS

RADIUS (*Remote Authentication Dial In User Service*) is a protocol for transferring authentication, configuration and accounting information between a *Network Access Server* (e.g. a router) which desires to authenticate its links, and a shared *RADIUS Server*. The RADIUS (authentication) server manages a database of users and provides authentication (verifying user name and password) and configuration information (e.g. IP address, subnet mask, etc.) to the client. The RADIUS (accounting) server stores accounting information about past sessions.

The router acts as a RADIUS client, sending requests to a defined list of RADIUS servers. Router modules use RADIUS in different ways depending on their individual requirements. See the relevant chapter for specific details of how RADIUS is used by the router. For example, ISDN and ACC can be configured to use RADIUS to authenticate a call and return information such as the IP address and network mask to be used to complete the call.

A RADIUS server is added or deleted using the commands:

```
ADD RADIUS SERVER=ipadd SECRET=secret
DELETE RADIUS SERVER=ipadd
```

The list of known RADIUS servers is displayed using the command:

```
SHOW RADIUS
```

Table 1-4 on page 1-20 lists the RADIUS attributes supported by the router.

Table 1-4: RADIUS attributes supported by the router.

RADIUS Attribute Name	When Used	Description
User-Name	Authentication request Accounting request	The name of the user to be authenticated.
User-Password	Authentication request	The password of the user to be authenticated, or the user's input following an *Access-Challenge*.
CHAP-Password	Authentication request	The response value provided by a PPP CHAP user in response to a challenge.
NAS-IP-Address	Authentication request Accounting request	The identifying IP Address of the NAS which is requesting authentication of the user.
NAS-PORT	Authentication request	The physical port number of the NAS which is authenticating the user.
Calling-Station-Id	Authentication request	The number that the call to the NAS came from, using Automatic Number Identification (ANI) or similar technology.
Framed-IP-Address	Authentication accept	The address to be configured for the user.
Framed-IP-Netmask	Authentication accept	The IP Netmask to be configured for the user when the user is a router to a network.
Callback-Number	Authentication accept	A dialling string to be used for callback.
Framed-Route	Authentication accept	Provides routing information to be configured for the user on the NAS.
Framed-IPX-Network	Authentication accept	The IPX Network number to be configured for the user.
Session-Timeout	Authentication accept	The maximum number of seconds of service to be provided to the user before the session terminates.
Idle-Timeout	Authentication accept	The maximum number of consecutive seconds of idle connection allowed to the user before prompt or termination of the session.
Framed-AppleTalk-Network	Authentication accept	The AppleTalk Network number which the NAS should probe to allocate an AppleTalk node for the user.
Framed-AppleTalk-Zone	Authentication accept	The AppleTalk Default Zone to be used for this user.
CHAP-Challenge	Authentication request	The CHAP Challenge sent by NAS to a PPP CHAP user.
Acct-Status-Type	Authentication start	Whether or not the *Accounting Request* marks the beginning (*Start*) or end (*Stop*) of the user service.
Acct-Input-Octets	Authentication stop	The number of octets received from the port over the course of this service.
Acct-Output-Octets	Accounting stop	The number of octets sent to the port over the course of this service.
Acct-Session-Id	Accounting start Accounting stop	A unique accounting ID used to match start and stop records in a log file.
Acct-Authentic	Accounting start	The method by which the user was authenticated.
Acct-Input-Packets	Accounting stop	The number of packets received from the port in the course of delivering this service to a Framed User.
Acct-Output-Packets	Accounting stop	The number of packets sent to the port in the course of delivering this service to a Framed User.
Acct-Terminate-Cause	Accounting stop	The mechanism or reason for terminating the session.

TACACS

The router supports the use of TACACS (*Terminal Access Controller Access System*) servers as an alternative method of user authentication. The router sends a TACACS request, which includes the username and password, to each TACACS server in turn. The TACACS server responds with an "*accept*" or "*reject*" response. If the response is "*accept*" then the user is authenticated. If the response is "*reject*", a request is sent to the next server in the list until all servers have been queried. If all the servers on the list reject the request then the user authentication is rejected.

There is a timeout period for TACACS requests, and if a response is not received within the specified time, the request is retried. The timeout period and the number of retries to be attempted can be configured using the command:

```
SET USER [TACRETRIES=0..10] [TACTIMEOUT=1..60]
```

Requests are sent to the TACACS servers on the list in a round-robin fashion until one of the servers accepts the request, all of the servers have rejected the request or the number of retries has been reached for each server.

A TACACS server is added to the list of defined servers with the command:

```
ADD TACACS SERVER=ipadd
```

where *ipadd* is the IP address of the TACACS server, in dotted decimal notation. A TACACS server can be deleted from the list of servers using the command:

```
DELETE TACACS SERVER=ipadd
```

The list of currently defined TACACS servers can be displayed with the command:

```
SHOW TACACS SERVER
```

Remote Management

Managing remote routers is as easy as managing the local router to which the terminal is connected. From a terminal connected to any port (with either USER or MANAGER privilege), use the command:

```
TELNET ipadd
```

to Telnet to the remote router, specifying the remote router's IP address. If the connection is successful a login prompt from the remote router is displayed. Login using a login name that has been defined with MANAGER privilege (such as the default MANAGER login name), and enter the password.

To return to the local router, use the command:

```
LOGOFF
```

to terminate the connection. For more information about using Telnet, see *Chapter 11, Terminal Server*.

Monitoring and Fault Diagnosis

Event Logging

The router responds to certain significant events by generating an event log message. Each router maintains a local event log of the most recent log messages. To view the log, use the command:

```
SHOW LOG
```

The logging facility provides a powerful, flexible and easily configurable tool for monitoring network activity and selecting and displaying the results. User-defined output definitions can filter, prioritise and output log messages to RAM, NVS, an asynchronous port, another router, a syslog server or an email address. See *Chapter 23, Logging Facility* for a detailed description of the logging facility.

Restarts

Some changes to configuration parameters require the router to be restarted for the changes to take affect. The router is restarted with the command:

```
RESTART {REBOOT|ROUTER} [CONFIG={filename|NONE}]
```

If the router encounters a fatal error condition from which it can not recover, it automatically performs a restart. The reason for the restart may be determined by examining the router's exception list, with the command:

```
SHOW EXCEPTION
```

The conditions that the router encountered when it last restarted, such as the amount of RAM and the state of the battery-backed RAM, can be viewed with the command:

```
SHOW STARTUP
```

A complete snapshot of the state of the router prior to the last fatal condition can be displayed with the command:

```
SHOW DEBUG
```

CPU Utilisation

The CPU utilisation over the last second, ten seconds, one minute or since the router last restarted can be displayed with the command:

```
SHOW CPU
```

Memory

The state of the router's buffer pool can be examined with the command:

```
SHOW BUFFER
```

If the pool of free buffers drops below a critical threshold, the router progressively disables processes, resulting in a loss of functionality. This problem can potentially arise when a fast source sends enormous amounts of data to a slow destination or down a slow link. However, the cause is more likely to be a problem with the router itself. The problem can be corrected in the short term by restarting the router, but it should be reported to your supplier.

Fast buffer memory, on power PC based routers and switches only) is cached by the CPU and is available only for program variable storage. It cannot be used for packet buffers.

The contents of memory can be examined with the command:

```
DUMP
```

and modified with the command:

```
MODIFY
```

The DUMP command on page 1-61 and the MODIFY command on page 1-75 are provided as diagnostic tools and should not be needed for normal operation of the router. Inappropriate use of these commands may cause a malfunction of the router, resulting in the loss of network services.

Power Supply

The AT-AR740 router automatically monitors its own power supply and fan, and has the option of a redundant power supply. If a redundant power supply (RPS) is attached, the AT-AR740 software can detect the presence of the RPS and the state of its output voltages and fan. RPS monitoring, turned off by default, can be turned on or off using the command:

```
SET SYSTEM RPSMONITOR={ON|OFF}
```

The SHOW SYSTEM command on page 1-124 displays the state of the main power supply and fan, and whether or not the RPS is being monitored. If RPS monitoring is enabled, it also shows whether an RPS is connected, and the state of its output voltages and fan.

When a fault occurs in the main power supply or fan, the system LEDs on the front and back panels of the AT-AR740 are flashed in a pattern that identifies the fault (Table 1-5 on page 1-23). If RPS monitoring is on, the system LEDs also flash to indicate failures in the RPS connection, power supply or fan. Multiple faults are indicated by cycling through each error code.

Table 1-5: LED indications for fan an power supply faults on the ATAR740 router.

When this fault occurs...	The System LED flashes in this pattern...
Router fan failure	One flash: 0.2s on, 2s pause, (repeat)...
RPS fan failure	Two flashes: 0.2s on, 0.3s off, 0.2s on, 0.3s off, 2s pause, (repeat)...
Router PSU failure	Three flashes: 0.2s on, 0.3s off, 0.2s on, 0.3s off, 0.2s on, 2s pause, (repeat)...
RPS PSU failure	Four flashes: 0.2s on, 0.3s off, 0.2s on, 0.3s off, 0.2s on, 0.3s off, 0.2s on, 2s pause, (repeat)...
RPS not connected	Five flashes: 0.2s on, 0.3s off, 0.2s on, 0.3s off, 0.2s on, 0.3s off, 0.2s on, 0.3s off, 0.2s on, 2s pause, (repeat)...

Nonvolatile Storage (NVS)

The nonvolatile storage (NVS) module provides a facility to store information so that it is not destroyed when the router is reset or powered off. The type of information that may be stored in the NVS are module configuration tables, interface configurations, patches and script files.

The NVS is organised as blocks of contiguous memory of varying size. A block ID and an index uniquely identifies each block and an owner ID indicates which module created the block. NVS blocks are normally maintained by the modules that created them, but this can also be done manually.

The command:

```
SHOW NVS
```

displays information about each block in the NVS including ID, index, owner, size, and creation date. The command:

```
SHOW NVS FREE
```

displays the amount of free space in the NVS and the size of the largest block that can be created.

Blocks can be created using the command:

```
SET NVS CREATE
```

and deleted using the command:

```
SET NVS DELETE
```

All blocks can be deleted using the command:

```
SET NVS CLEAR_TOTALLY
```

Data in the NVS blocks can be displayed using the command:

```
SHOW NVS DUMP
```

and modified using the command:

```
SET NVS MODIFY
```

The router’s file subsystem provides a file-based interface to NVS memory, allowing NVS to be used to store scripts and other files.

FLASH Memory

FLASH memory is a nonvolatile, reusable memory device that allows large volumes of data (up to 8MB) to be stored in the router. The primary function of FLASH memory in the router is to store multiple software releases, simplifying the servicing and maintenance requirements of the router. Releases can be remotely loaded into FLASH memory from any router port using the Loader Module. Multiple software releases can be loaded and then individually selected for use at runtime by the Install Module. Comprehensive management features are provided to examine the state of the FLASH memory and to view or modify the contents.

To enable FLASH memory to support applications other than just software releases it is structured like a disk subsystem with files which can be created, deleted, read and written by any router module. Files can also be manipulated directly using the command line interface. This allows FLASH to be used to store any type of data, including releases, patches, configurations and logs.

Physical Characteristics

FLASH memory is a special type of nonvolatile memory which can be erased and reprogrammed many times in-situ. FLASH memory has advantages over other types of nonvolatile memory in that it has a very large storage capacity and it does not require power from a battery to retain stored data. The main limitations of FLASH memory are that it has a fixed erase block size, so individual bytes can not be changed without first clearing a whole block of data, and a limit on the number of erase cycles that can be performed. However, the erase limit is very high, typically at least 100000 cycles, which would allow three erases per day for 100 years before the limit was exceeded.

In the router, FLASH memory can be installed directly onto the system board during manufacture, or subsequently as FLASH SIMM sticks mounted on the 80-pin SIMM connector.

The FLASH SIMM sticks used are specially designed for the router and must be obtained from your distributor or reseller.

The presence and amount of FLASH memory installed is displayed using the command:

```
SHOW SYSTEM
```

More detailed information about the FLASH memory can be displayed using the command:

```
SHOW FLASH PHYSICAL
```

The File Subsystem

The file subsystem provides a consistent file-based interface to all physical memory devices on the router used for data storage, including NVS and FLASH memory. The file subsystem allows data, such as code releases, licence information and configuration scripts, to be stored on the router in a file structure and manipulated in the same way with the same commands, regardless of whether the file is physically stored in NVS or FLASH.

File Naming Conventions

The file subsystem provides a flat file system—directories are not supported. Files are uniquely identified by a file name of the form:

```
[device:]filename.ext
```

where:

- *device* specifies the physical memory device on which the file is stored, and must be one of NVS or FLASH. If *device* is specified, it must be separated from the rest of the file name by a colon (“:”). If *device* is not specified, the default is FLASH.

- *filename* is a descriptive name for the file, and may be one to eight characters in length. Valid characters are lowercase letters (a–z), uppercase letters (A–Z), digits (0–9) and the hyphen character (-).
- *ext* is a file name extension, one to three characters in length. Valid characters are lowercase letters (a–z), uppercase letters (A–Z), digits (0–9) and the hyphen character (-). The extension is used by the router to determine the data type of the file and how to use the file (Table 1-6 on page 1-26). If *ext* is specified, it must be separated from the *filename* portion by a period (".")

Table 1-6: File extensions and file types.

Extension	File type/function
CFG	Configuration or boot script
HLP	Help file
HTM	HTML file used by the HTTP server
LIC	Licence information
LOG	Log file
MDS	Modem script
PAT	Patch
PAZ	Compressed patch
REL	Software release
REZ	Compressed release
SCP	Script
TXT	Generic text file

The following are examples of valid file names:

`flash:config.scp`	A script file.
`flash:28-72.rel`	Software Release 7.2.
`nvs:28-70-02.pat`	A patch for Software Release 7.0.

The following are examples of illegal file names:

`flash:/sys/head_o.cfg`	"/" is not a valid delimiter character, and directories are not supported.
`flash:headoffice.cfg`	The filename is too long. A maximum of eight characters is allowed.

Using Wildcards to Specify Groups of Files

The asterisk character ("*") may be used as a wildcard character in some commands to identify a groups of files to be processed by the command. A wildcard must replace an entire field of the file name — *device*, *filename* or *ext*. A wildcard can not be combined with other characters. The following are examples of valid wildcard expressions:

```
flash:*.*
*:*.rel
```

The following is not a valid wildcard expression:

```
flash:28*.rel
```

Working With Files

To display a directory of the files stored on the router, in both FLASH and NVS, use the command:

```
SHOW FILE
```

To limit the display to certain files, use the command:

```
SHOW FILE=filename
```

filename may contain wildcard characters. Files can be permanently deleted using the command:

```
DELETE FILE=filename
```

filename may contain wildcard characters. Files can be created using the router's built-in editor, using the command:

```
EDIT [filename]
```

or by downloading the file via HTTP, TFTP or ZMODEM, using the command:

```
LOAD FILE=filename
```

FLASH File System

The FLASH File System (FFS) provides additional functionality on top of that provided by the file subsystem, to manage the peculiarities of FLASH technologies. The additional functionality of the FFS includes:

- Header and data integrity is ensured with a checksum mechanism.
- All FLASH processes can recover from a power cycle without data loss.
- Automatic recovery of deleted file space by the compaction process.

Information about the state of the FFS can be displayed using the command:

```
SHOW FLASH
```

Working with FFS Files

FFS files can be managed like any other file on the router, using the standard file subsystem commands:

```
EDIT [filename]
DELETE FILE=filename
LOAD FILE=filename
SHOW FILE[=filename]
```

In addition, the following commands can be used to manage files stored in FLASH memory. To display a directory of the files stored in FLASH memory, use the command:

```
SHOW FFILE [CHECK]
```

If CHECK is specified then the file data checksum is also verified. This is included as an option because it can take some time to complete a check on large files. A file data check is also carried out each time a file is read by the system.

A FLASH file can be deleted with the command:

```
DELETE FFILE=filename
```

Wildcards are allowed in the *filename* and *ext* fields of the file name, but are not allowed in the device field. The file is marked as deleted but the space occupied by the file is not freed until the next compaction process.

The FLASH memory can be completely erased using the command:

```
CLEAR FLASH TOTALLY
```

⚠ ***This command totally erases all stored FLASH information and reformats the FLASH file structure.***

Compaction

FLASH memory has a granular erase structure which requires data to be erased in large blocks rather than as individual bytes. To allow files to be mapped onto this structure the FFS keeps track of the status of each file — whether it is being written, is complete or is deleted. When the total amount of FLASH memory used for deleted files reaches a preset limit a compaction process is initiated. Compaction searches through the FLASH memory copying good files to a new location. As soon as all the good files within an erase block have been copied the block is cleared. This results in any deleted files present in the block being cleared, freeing up space for new files. If there is a large amount of FLASH memory in use then the compaction process can take several seconds to complete. However, FLASH memory operations continue to operate without being affected by the compaction process.

⚠ ***While FLASH is compacting, do not restart the switch or use any commands that affect the FLASH file subsystem. Do not restart the switch, or create, edit, load, rename or delete any files until a message confirms that FLASH file compaction is completed. Interrupting flash compaction may result in damage to files.***

Compaction can also be manually initiated using the command:

```
ACTIVATE FLASH COMPACTION
```

FFS Messages

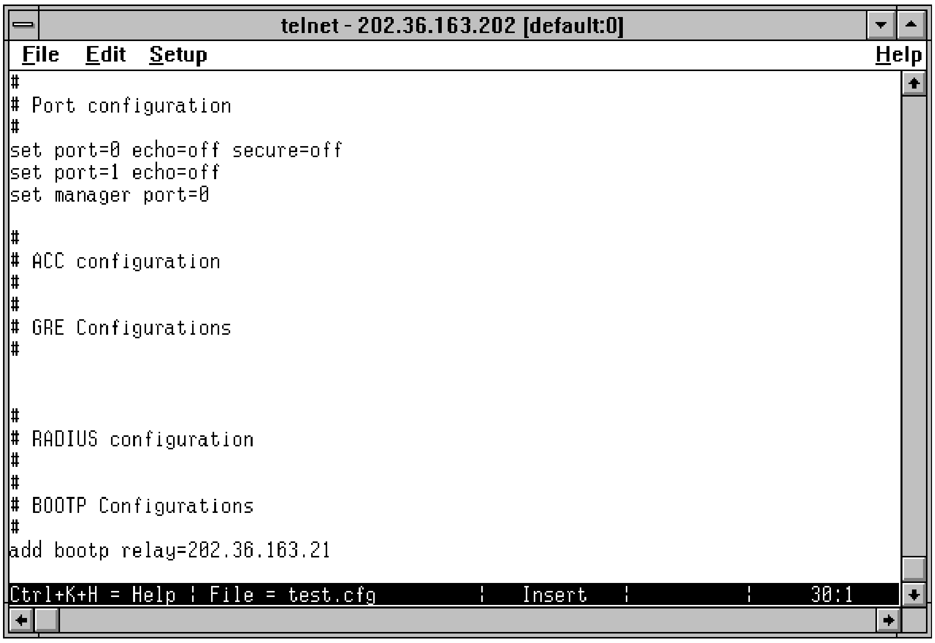
Some FFS processes generate messages in the system log (displayed with the SHOW LOG command on page 23-34 of *Chapter 23, Logging Facility*) which include FFS message codes. See "*FLASH File System Message Codes*" on page C-6 of *Appendix C, Reference Tables* for a complete list of the possible codes and their meanings.

The Built-in Editor

The router has a built-in full-screen text editor for editing ASCII text files stored on the router file subsystem.

The editor uses VT100 command sequences and should only be used with a VT100-compatible terminal, terminal emulation program or Telnet client. The VT100 screen only supports 24 lines, unlike a PC. Lines 1–23 are used to display the text of the file being edited, and line 24 is used as the status bar and command line (Figure 1-3 on page 1-29). The status bar displays the current file name, line and column position in the file and the editing mode (overstrike or insert). When additional command information is required, such as a file name or search text, then a prompt is displayed in the status bar.

Figure 1-3: The editor screen layout.



```
#
# Port configuration
#
set port=0 echo=off secure=off
set port=1 echo=off
set manager port=0

#
# ACC configuration
#
#
# GRE Configurations
#


#
# RADIUS configuration
#
#
# BOOTP Configurations
#
add bootp relay=202.36.163.21
Ctrl+K+H = Help ¦ File = test.cfg      ¦    Insert    ¦          ¦     30:1
```

The editor is invoked with the command:

```
EDIT [filename]
```

The file name is optional as a file can be loaded, or a new file can be created from within the editor itself. The editor is currently limited to editing one file at a time. To overcome this limitation use the cut and paste facility to transfer text between files.

Before starting the editor make sure your terminal, terminal emulation program or Telnet client is 100% compatible with a VT100 terminal.

Help can be obtained at any time while in the editor by pressing [Ctrl/K,H]; that is, holding down the Ctrl key and pressing in turn the K key then the H key.

HTTP Client and Server

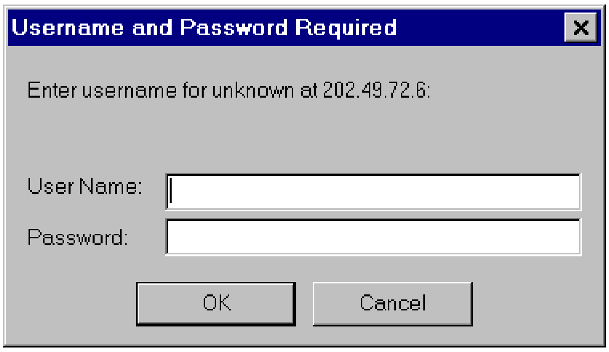
The router has a built-in HTTP client and server. The HTTP server is compatible with any HTTP/1.1-compliant browser and allows the router to serve HTML pages out of FLASH memory to a remote web browser. The HTTP server is enabled by default. To disable the HTTP server, or to enable the HTPP server after it has been disabled, use the commands:

```
DISABLE HTTP SERVER

ENABLE HTTP SERVER
```

When a user attempts to access the router via a web browser, the HTTP server will request authentication from the browser. The browser will prompt the user for a username and password (Figure 1-4 on page 1-30).

Figure 1-4: Logging in to the router from a web browser.



Username and Password Required

Enter username for unknown at 202.49.72.6:

User Name:

Password:

The username and password entered by the user must match a user defined in the User Authentication Database (see "*The User Authentication Database*" on page 1-13).

By default, the router's homepage is homepage.htm. This is the page the HTTP server returns when it receives a request that does not specify a particular page, and when no web-based GUI is installed on the router. If there is a web-based GUI, the router will return the GUI homepage when a request does not specify a page. To change the home page to another file stored in the routers's FLASH memory, use the command:

```
SET HTTP SERVER HOMEPAGE=filename.htm
```

All GET, configure and monitor requests, and authorisation failures are logged to the Logging Facility (see *Chapter 23, Logging Facility*). Debugging can be enabled or disabled using the commands:

```
ENABLE HTTP DEBUG={ALL|AUTH|MSG|SESSION}
DISABLE HTTP DEBUG={ALL|AUTH|MSG|SESSION}
```

Debug messages display authorisation attempts, HTTP GET and POST requests and responses, and TCP state changes. The currently enabled debugging options can be displayed using the command:

```
SHOW HTTP DEBUG
```

The command:

```
RESET HTTP SERVER
```

restarts the HTTP server, disables debugging and clears all counters.

To display the current status of the HTTP server, use the command:

```
SHOW HTTP SERVER
```

To display information about the currently active sessions on the HTTP server, use the command:

```
SHOW HTTP SESSION
```

The HTTP client enables the router to act as a browser by sending HTTP GET or POST requests to another HTTP server. The HTTP client is used by the

Configuration Wizard to download updates from a support web site. To display the current status of the HTTP client, use the command:

```
SHOW HTTP CLIENT
```

Resolving Uniform Resource Locators (URLs)

When the HTTP server receives a request for a URL, it uses the following procedure to resolve the URL:

- If the URL matches the name of a file stored in the router's FLASH memory, the file will be loaded and sent to the browser.
- If the URL does not match the name of a file stored in FLASH, the HTTP server searches a list of dynamically generated HTML pages for a match. If a match is found the page is generated and sent to the browser.
- If the URL does not match the name of a file stored in FLASH or the name of a dynamically generated HTML page, the HTTP server will return the HTML error 404, indicating the URL could not be found.

Mail Subsystem

The router has a built-in email client and SMTP (*Simple Mail Transfer Protocol*) server to enable email messages to be sent from the router to remote mail systems using SMTP. The email client generates messages that comply with RFC 822 ("*Standard for the Format of ARPA Internet Text Messages*"). The SMTP server implements RFC 821 ("*Simple Mail Transfer Protocol*") for the transmission of mail messages.

The SMTP server can only transmit email messages; it can not accept email messages from other mail systems.

A mail message is transmitted using the command:

```
MAIL TO=destination {FILE=filename|MESSAGE=message}
    [SUBJECT=subject] [ETRN=mail-domain]
```

from the router's command line prompt or from a script. Messages can also be transmitted automatically by the Trigger Facility (*Chapter 20, Trigger Facility*), the Logging Facility (*Chapter 23, Logging Facility*) and the firewall (*Chapter 31, Firewall*).

The body of the message may contain either a single character string or the contents of a file in the router's NVS or FLASH memory.

The current state of the mail subsystem and the messages queued for transmission can be displayed using the command:

```
SHOW MAIL
```

Messages that are queued awaiting transmission can be deleted using the command:

```
DELETE MAIL=id
```

The progress of mail messages can be monitored using the mail subsystem’s debugging option, which is enabled or disabled with the commands:

```
ENABLE MAIL DEBUG
```

```
DISABLE MAIL DEBUG
```

Configuration Examples

The following procedures illustrate the steps required to configure the mail subsystem and transmit email messages. It is assumed that IP has already been enabled and correctly configured on the router.

To configure the mail subsystem:

1. **Configure a DNS Server.**

   Configure the IP address of the DNS server that the mail subsystem will use to resolve email addresses into IP addresses. Without a DNS server the mail subsystem will not function.

   ```
   SET IP NAMESERVER=192.168.5.3
   ```

2. **Configure the mail host name.**

   Configure the host name used by the mail subsystem when communicating with other mail systems. Normally this is the fully qualified domain name of the router. Without a host name the mail subsystem will not function.

   ```
   SET MAIL HOSTNAME=ho1.company.com
   ```

3. **Check the configuration.**

   Check that the mail subsystem is correctly configured and enabled.

   ```
   SHOW MAIL
   ```

To send a file via email from the router’s command prompt:

1. **Send the file as the body of a mail message.**

   Text format files (files with `.CFG`, `.SCP` and `.TXT` extensions) can be transferred from the router to a remote user in the body of an email message. For example, configuration scripts can be sent to a central host for management and change control. In this example, the file `boot.cfg` is sent to the network administrators email address netman@company.com:

   ```
   MAIL TO=netman@company.com SUBJECT=”Boot script for
       ho1.company.com” FILE=boot.cfg
   ```

2. **Check the progress of the message.**

   The progress of the message as it is transmitted to the remote mail system can be monitored using the command:

   ```
   SHOW MAIL
   ```

To transmit messages automatically using the Trigger Facility:

1. **Create a script to generate a mail message.**

   Create a script called `mailcpu.scp` using the router’s built-in editor that sends a message to the network administrator:

   ```
   EDIT mailcpu.scp
   ```

The script contains the following line:

```
MAIL TO=netman@company.com SUBJECT="WARNING: Load high"
   MESSAGE="CPU utilisation exceeded 80%"
```

Note that it is not necessary to identify the router in either the *Subject* field or the message as the mail system automatically inserts the router's host name in the *From* field of the message header.

2. **Create a trigger to activate the script.**

   Enable the trigger module and create a trigger to activate the script when the router's CPU utilisation rises above 80%:

```
ENABLE TRIGGER

CREATE TRIGGER=1 CPU=80 DIRECTION=UP SCRIPT=mailcpu.scp

SHOW TRIGGER=1
```

Software Releases and Patches

Prior to Software Release 6.8, system code resided in a set of Erasable Programmable Read Only Memories (EPROMs). At router startup the system code was copied to RAM to allow code patches to be made. Patches could be loaded in to nonvolatile storage (NVS) which would overlay the system code in RAM.

From Software Release 6.8, software releases can be stored in FLASH and loaded into RAM from FLASH without changing EPROMs. Patches can be stored in and loaded from either NVS or FLASH. The router will boot from any designated software release in FLASH, or as a last resort, from the software release in EPROM.

From Software Release 7.2, software releases and patches are also available as compressed release files. A compressed release file is substantially smaller than the equivalent standard release file, requires less FLASH memory to store, and can be downloaded to the router in less time. The disadvantage is that the router startup process takes longer (5–25 seconds) when booting from a compressed release.

From Software Release 7.6.0, software releases have a new numbering scheme. A release is now identified by a number of the format <*major*>.<*minor*>.<*interim*>. The release whose interim release number is "0" is known as the "base release". For example, Software Release 7.6.0 is the base release of 7.6, Software Release 7.6.1 is the first interim release of 7.6.

Releases

A software release contains a copy of the system software that executes on the router. Releases are given numbers that look like "7.6.0". In this case the *major* release number is "7", the *minor* release number is "6" and the *interim* release number is "0". A release can be stored either in EPROM or in FLASH. Releases can not be stored in NVS because the amount of NVS available in the router is not large enough to hold an entire release.

A standard release is a single file with a name of the form:

```
mm-rrr.REL
```

where `mm` identifies the router model (Table 1-7 on page 1-34) and `rrr` is the release number (e.g. `761` for Software Release 7.6.1).

Table 1-7: Software Release filename formats

Filename Format	Router Model
8-rrr.REL	AR300 Series routers
52-rrr.REL	AR720 router
18-rrr.REL	Network iQ 1800 Series routers
28-rrr.REL	Network iQ 1000/2800/3000/3800 Series routers
48-rrr.REL	Network iQ 4800 Series routers

There are two methods of providing compressed releases, depending on the release number of the base EPROMs in the router. For Software Release 7.4 and later, compressed releases are supported by the base EPROMs and the file required for a compressed release is:

```
mm-rrr.REZ
```

For Software Release 7.2, a special download release is required. The files required are:

```
mm-rrrC.REL
mmooDrrr.REL
```

where `oo` is the release number of the base EPROMs. Releases prior to Software Release 7.2 do not support compressed releases.

Releases stored in FLASH are subject to licencing. A FLASH release may be downloaded into the router, but can not be used until the correct licence information is entered.

Licence information will be supplied by your distributor or reseller with each software release. For compressed releases on EPROM releases prior to Software Release 7.4, a separate licence is required for each of the files mm-rrC.REL and mmooDLrr.REL.

The licence is encoded and is specific to a particular router and a particular release. A licences may be a FULL licence or a 30-day licence. A 30-day licence will expire after 30 days; a FULL licence does not have an expiry date. To enable a release licence, use the command:

```
ENABLE RELEASE
```

To disable a release licence, use the command:

```
DISABLE RELEASE
```

The current status of release licences in the router can be shown with the command:

```
SHOW RELEASE
```

A number of releases can be stored in the router at once. The EPROM release is always available, and one or more releases may be stored in FLASH. The router contains INSTALL information that specifies which release (EPROM or one of the FLASH releases) is to be loaded at boot. This information may be changed at any time. The INSTALL information can be overridden so that the release stored in EPROM is loaded.

A software release is specific to a particular router series. It is not possible to run a release on any router series other than that for which the release was made. The same router release will, however, run on all models in the same series. If an attempt is made to load the wrong software release into the router the boot process will fail.

Patches

A router patch contains changes to the router software. A patch usually contains fixes to software errors, although enhancements to the software may sometimes be released as patches. Patches are identified by names like “7.6.0-2”. In this case, “7.6.0” is the release that the patch modifies, and “2” is a version number that identifies the patch in a series (1, 2, 3...) of patches. Patches are specific to a particular release, and thus to a particular router series. Any attempt to use a patch with a non-matching release will result in failure.

A standard patch is a single file with a name of the form:

```
mmrrr-pp.PAT
```

where `mm` identifies the router model (Table 1-7 on page 1-34), `rrr` is the release number (e.g. `761` for Software Release 7.6.1), and `pp` is the version number of the patch.

Compressed patches are supported on routers running a base EPROM release of Software Release 7.4 or later. The patch consists of a single file:

```
mmrrr-pp.PAZ
```

Compressed patches are not supported for routers running base EPROMs prior to Software Release 7.4 and running a compressed release.

Patches may be loaded into either FLASH, or, if the patch is small enough, into NVS. There is no difference between a patch file loaded into FLASH and a patch file loaded into NVS; the difference lies in the command used to load the file.

The INSTALL information that specifies the release to use also contains information about the patch. It is possible to load a router with a number of different patches, but only one patch can be run at a time.

Router Startup Operations

When the router boots, the following sequence of operations is performed:

1. Perform startup self tests.
2. Perform the install override option.
3. Load the EPROM release as the INSTALL boot.
4. Inspect and check INSTALL information.
5. Load the required EPROM or FLASH release as the main boot.
6. Start the router.
7. Execute the boot script, if one has been configured.

If a terminal is connected to port 0, a series of status and progress messages, similar to those shown in Figure 1-5 on page 1-36, are displayed during the startup process.

Figure 1-5: Router startup messages.

```
INFO: Self tests beginning.
INFO: RAM test beginning.
PASS: RAM test, 4096k bytes found.
INFO: BBR tests beginning.
PASS: BBR test, 128k bytes found.
PASS: BBR test. Battery OK.
INFO: Self tests complete
INFO: Downloading router software.
Force EPROM download (Y) ?
INFO: Initial download succeeded
INFO: Executing configuration script <boot.cfg>
INFO: Router startup complete

Manager >
```

The startup self tests check the basic operation of the router. A router that passes these tests should be able to at least proceed far enough to perform the load of the EPROM release and to start operating.

The install override option is designed to allow a mandatory router boot from the EPROM release. The message:

```
Force EPROM download (Y)?
```

is displayed on the terminal connected to port 0 and the router pauses. If a key is not pressed within a few seconds, the startup process will continue and all steps in the sequence will be executed. If the [Y], [S] or [Ctrl/D] key on the terminal is pressed immediately after the message is displayed, the router startup process can be altered (Table 1-8 on page 1-36).

Table 1-8: Router startup sequence keystrokes.

Pressing key...	Forces the router to...
Y	Load the EPROM release, with no patch, and skip straight to step 6.
S	Start with the default configuration. Any boot script or NVS configuration is ignored.
N	Configure from NVS, ignoring any boot script.
[Ctrl/D]	Enter diagnostics mode.

The EPROM release is always loaded first when starting the router. This release contains all the code required to obtain and check the INSTALL information. This first boot is known as the INSTALL boot. The INSTALL information is inspected and the router set up to perform another load. Even if the actual release required is the EPROM release, another load is always performed. At this point the patch load, if required, is also performed.

The router startup occurs immediately after the install override option, or after the INSTALL information check. This performs a full startup of router software and initiates the normal operation of the router.

Finally, if a boot script has been defined, the script is executed.

Downloading Releases and Patches into the Router

The LOADER module is responsible for loading and storing releases, patches and other files into either NVS or FLASH. The LOADER module uses the *Trivial File Transfer Protocol* (TFTP), *Hypertext Transfer Protocol* (HTTP) or ZMODEM over an asynchronous port, to retrieve files from a network host. The FFS and NVS modules are used to create, write and destroy release and patch files.

The loader can be configured with the command:

```
SET LOADER
```

This command sets default values for the name of the file to load, the network host to load it from, and the memory location in which to store the file. These default values can be overridden when the load actually takes place. A time delay between initiating a load and the start of the load can also be configured.

The configuration of the LOADER module can be displayed with the command:

```
SHOW LOADER
```

This shows the default configuration for the LOADER module as well as the status of any current file transfer.

To actually initiate a load, use the command:

```
LOAD
```

This command will use either the default values for the LOADER module or the values specified on the command line. The command:

```
SHOW LOADER
```

displays the progress of the load. The current load can be stopped at any time using the command:

```
RESET LOADER
```

leaving the LOADER module ready to load again. Only one file can be loaded at a time. Another load can not be initiated while loading is in progress.

Once the release or patch file has been loaded, its presence can be checked with the command:

```
SHOW FILE
```

for files in FLASH, or using the command:

```
SHOW PATCH
```

for files in NVS. A release or patch file can be removed with the command:

```
DELETE FILE
```

for files in FLASH, or with the command:

```
DESTROY PATCH
```

for files in NVS.

Files to be loaded by the LOADER module must be resident on a TFTP server accessible via the network, or accessible via the ZMODEM protocol over an asynchronous port. Release and patch files are ASCII files, and consist of a header followed by a sequence of Motorola S-records containing the actual code for the release or patch. The header has a standard format, which provides information about the release or patch to the router.

The header in the release or patch file should not be altered. At best, this will cause the file load or install to fail, at worst the router could be put into a state where it will not boot correctly until field service action is taken.

Install Information

The INSTALL module is responsible for maintaining install information and loading the correct install at boot. An *install* is a record identifying a release and an optional patch. Three installs are maintained by the INSTALL module, *temporary, preferred* and *default*.

The default install is the install of last resort. The release for the default install can not be changed by the manager and is always the EPROM release. The patch for the default install may be set by the manager.

The temporary and preferred installs are completely configurable. Both the release and an associated patch may be set. The release may be EPROM or a release stored in FLASH.

The three different installs are required to handle the following situations:

- A default install is required to handle the case when only the EPROM release is present.
- A temporary install is required to allow a release and/or patch to be loaded once only, in case it causes a router crash.
- A preferred install is required because the default install can not be anything other than the EPROM.

The install information is inspected in a strict order. The temporary install is inspected first. If this install information is present, the temporary install is loaded. At the same time, the temporary install information is deleted. This ensures that if the router reboots immediately as the result of a fatal condition caused by the temporary install, the temporary install will not be loaded a second time.

If there is no temporary install defined, or the install information is invalid, the preferred install is inspected. If present, this install is loaded. The preferred install information is never deleted.

If neither temporary nor preferred installs are present, the default install is used. The default install will always be present in the router, because if, for some reason, it is not, the INSTALL module will restore it.

The preferred install should not be set up with an untested release or patch. It is advisable to install new releases or patches as the temporary install, and when the router boots correctly, to then set up the preferred install with the new release or patch.

To change the install information in the router, use the command:

```
SET INSTALL
```

To delete a particular install (except the default install) use the command:

```
DELETE INSTALL
```

To display the current install information, including which install is currently running in the router, and how the install information was checked at the last reboot, use the command:

```
SHOW INSTALL
```

Examples

Installing a Standard Release using TFTP

This example assumes that the router is correctly configured to allow TFTP to function. This means that IP has been configured and the router is able to communicate with the designated TFTP server. The TFTP server is assumed to be functioning correctly and the release and patch files are assumed to be present in the server's TFTP directory. The router has no release or patch files, and is running the EPROM Software Release 7.6.0. The IP address of the server is 172.16.1.1. The name of the release file being loaded is `8-761.rel` and the name of the patch file is `8761-01.pat`.

To install a standard release:

1. **Configure the loader.**

   The LOADER module is set up with defaults to make the process of downloading files in future simpler. All release and patch files in this router will be stored in FLASH.

   ```
   SET LOADER SERVER=172.16.1.1 DEST=FLASH
   ```

2. **Download the release file to the router.**

   The release file is downloaded to the router with the command:

   ```
   LOAD FILE=8-761.REL
   ```

   The process of downloading a release file can take some time, even if the router and the TFTP server are connected by high speed links. An indicative time for downloading a release over Ethernet is 5 to 10 minutes. The progress of the download can be monitored with the command:

   ```
   SHOW LOAD
   ```

   When the download has completed, the presence of the file in FLASH can be displayed with the command:

   ```
   SHOW FILE
   ```

   This shows the file 8-761.rel is present.

3. **Enter the licence information for the release.**

   To allow this file to be used as a release file, a licence must be entered with the command:

   ```
   ENABLE RELEASE=8-761.REL PASSWORD=ce645398fbe NUMBER=7.6.1
   ```

   The password is provided by your distributor or reseller and is unique for the release number (in this case 7.6.1), the file name and the router's serial number.

4. **Test the release.**

   The release can now be tested, using the command:

   ```
   SET INSTALL=TEMPORARY RELEASE=8-761.REL
   ```

The install information can be checked with the command:

```
SHOW INSTALL
```

The router is then rebooted, and the install is checked again. This display should indicate, in the install history, that the temporary install was loaded.

5. **Make the release the default (permanent) release.**

   If the router operates correctly with the new release, the release may be made permanent with the command:

   ```
   SET INSTALL=PREFERRED RELEASE=8-761.REL
   ```

   Every time the router reboots from now on, the new release will be loaded from FLASH.

Installing a Standard Patch

This example illustrates how to install a standard patch on a router.

To install a standard patch:

1. **Download the patch file to the router.**

   Download the patch file 8761-01.pat into the router with the command:

   ```
   LOAD FILE=8761-01.PAT
   ```

   This download takes a lot less time than the download of the release file, and is verified by showing the file in FLASH.

2. **Test the patch.**

   As with the release, the patch should first be checked by incorporating it into a temporary install, with the command:

   ```
   SET INSTALL=TEMPORARY RELEASE=8-761.REL PATCH=8761-01.PAT
   ```

   The router is then rebooted, and the install is checked again. This display should indicate, in the install history, that the temporary install was loaded.

3. **Make the patch the default (permanent) patch.**

   If the router operates correctly with the new patch, the patch may be added to the preferred install with the command:

   ```
   SET INSTALL=PREFERRED PATCH=8761-01.PAT
   ```

   The release information is still present in the preferred install and does not have to be re-entered.

Installing a Compressed Release

This example is identical to the previous example, except that a compressed release and patch are installed.

To install a compressed release:

1. **Configure the loader.**

   The LOADER module is set up with defaults to make the process of downloading files in future simpler. All release and patch files in this router will be stored in FLASH.

   ```
   SET LOADER SERVER=172.16.1.1 DEST=FLASH
   ```

2. **Download the release files to the router.**

   The compressed release files are downloaded to the router with the commands:

   ```
   LOAD FILE=8-761.REZ
   ```

   The process of downloading a release file can take some time, even if the router and the TFTP server are connected by high speed links. An indicative time for downloading a release over Ethernet is 5 to 10 minutes. The progress of the download can be monitored with the command:

   ```
   SHOW LOAD
   ```

   When the download has completed, the presence of the files in FLASH can be displayed with the command:

   ```
   SHOW FILE
   ```

   This shows the file 8-761.rez is present.

3. **Enter the licence information for the release.**

   To allow these file to be used as release files, a licence must be entered for each file, with the commands:

   ```
   ENABLE RELEASE=8-761.REZ PASSWORD=ce645398fbe NUMBER=7.6.1
   ```

   The password is provided by your distributor or reseller and is unique for the release number (in this case 7.6.1), the file name and the router's serial number.

4. **Test the release.**

   The release can now be tested, using the command:

   ```
   SET INSTALL=TEMPORARY RELEASE=8-761.REZ
   ```

   The install information can be checked with the command:

   ```
   SHOW INSTALL
   ```

   The router is then rebooted, and the install is checked again. This display should indicate, in the install history, that the temporary install was loaded.

5. **Make the release the default (permanent) release.**

   If the router operates correctly with the new release, the release may be made permanent with the command:

   ```
   SET INSTALL=PREFERRED RELEASE=8-761.REZ
   ```

   Every time the router reboots from now on, the new release will be loaded from FLASH.

Installing a Compressed Patch

This example illustrates how to install a compressed patch on a router running base EPROMs for Software Release 7.6.1 or later.

To install a compressed patch:

1. **Download the patch files to the router.**

   Download the patch file 8761-01.paz into the router with the command:

   ```
   LOAD FILE=8761-01.PAZ
   ```

   This download takes a lot less time than the download of the release files, and is verified by showing the files in FLASH.

2. **Test the patch.**

   As with the release, the patch should first be checked by incorporating it into a temporary install, with the command:

   ```
   SET INSTALL=TEMPORARY RELEASE=EPROM PATCH=8761-01.PAZ
   ```

   The router is then rebooted, and the install is checked again. This display should indicate, in the install history, that the temporary install was loaded.

3. **Make the patch the default (permanent) patch.**

   If the router operates correctly with the new patch, the patch may be added to the preferred install with the command:

   ```
   SET INSTALL=PREFERRED RELEASE=EPROM PATCH=8761-01.PAZ
   ```

   The release information is still present in the preferred install and does not have to be re-entered.

Special Feature Licences

A special feature licence and password are required to activate some special features over and above the standard software release. Typically, these special features are covered by government security regulations. Special feature licences and passwords are quite separate and distinct from the standard software release licences and passwords.

A special feature licence may be either a 30-day trial license or a full (unlimited time) license and is specific to a router serial number. Special feature licences can not be transferred from one router to another.

The password for a special feature licence is a string of at least 16 hexadecimal characters, and encodes the special feature or features covered by the license, the licence type (30-day trial licence or full licence) and the router serial number. The password information is stored in the router's FLASH memory.

Special feature licences are enabled and disabled with the commands:

```
ENABLE FEATURE=featurename PASSWORD=password

DISABLE FEATURE={featurename|index}
```

A list of current special feature licences can be displayed with the command:

```
SHOW FEATURE[={featurename|index}]
```

Passwords must be ordered from your local distributor or reseller. You must specify the special features to be licenced and the serial number(s) of the router(s) on which the special feature licences are to be enabled.

Command Reference

This section describes the commands available on the router to support day-to-day operational and management activities.

See "*Conventions*" on page lxxi of *Preface* for details of the conventions used to describe command syntax. See *Appendix B, Messages* for a complete list of messages and their meanings.

ACTIVATE FLASH COMPACTION

Syntax `ACTIVATE FLASH COMPACTION`

Description This command activates the FLASH compaction process. Compaction is the process of cleaning up garbage (deleted files) by searching through FLASH memory copying valid files to a new block and erasing the old blocks. The compaction process normally occurs automatically when the amount of garbage reaches a preset limit, so manual compaction is not required for normal operation. This command can be used to recover garbage space before the automatic compaction threshold is reached.

Compaction is required because the FLASH memory has a granular erase structure which requires data to be erased in large blocks rather than as individual bytes. To allow files to be mapped onto this structure the FFS keeps track of the status of each file — whether it is being written, is complete or is deleted. When the total amount of FLASH memory used for deleted files reaches a preset limit a compaction process is initiated. Compaction searches through the FLASH memory copying good files to a new location. As soon as all the good files within an erase block have been copied the block is cleared. This results in any deleted files present in the block being cleared, freeing up space for new files. If there is a large amount of FLASH memory in use then the compaction process can take several seconds to complete. However, FLASH memory operations continue to operate without being affected by the compaction process.

⚠ ***While FLASH is compacting, do not restart the switch or use any commands that affect the FLASH file subsystem. Do not restart the switch, or create, edit, load, rename or delete any files until a message confirms that FLASH file compaction is completed. Interrupting flash compaction may result in damage to files.***

While compaction is underway the command:

```
SHOW FLASH
```

will indicate an FFS global operation of "compacting". When compaction is complete the global operation will return to "none".

See Also SHOW FLASH

ADD ALIAS

Syntax `ADD ALIAS=`*`name`*` STRING=`*`substitution`*

Where:

- *name* is a character string 1 to 132 characters in length. It may contain any printable character. If *name* contains spaces it must be enclosed in double quotes. It is case-sensitive.
- *substitution* is a character string 1 to 132 characters in length. It may contain any printable character. If *substitution* contains spaces it must be enclosed in double quotes. It is case-sensitive.

Description This command adds a new alias for a longer character sequence. When the user presses [Enter] to execute the command line, the command processor first checks the command line for aliases and substitutes the replacement text. The command line is then parsed and processed normally. Alias substitution is not recursive—the command line is scanned only once for aliases. An alias may represent either part of a command, or a complete command.

The ALIAS parameter specifies the name of the alias. This is the text that the user enters on the command line.

The STRING parameter specifies the substitution string. When the command processor parses the command line, all occurrences of the alias are replaced by this string.

Examples To create an alias “`df`” that expands to “`delete file=1-190.rez`”, use the command:

```
add alias=df string=”delete file=1-190.rez”
```

Thereafter, the following commands are equivalent:

```
df
```

```
del file=1-190.rez
```

See Also ADD ALIAS
DELETE ALIAS

ADD RADIUS SERVER

Syntax

```
ADD RADIUS SERVER=ipadd SECRET=secret PORT=port-number
    ACCPORT=port-number
```

where:

- *secret* is a character string, 1 to 63 characters in length. It may contain uppercase letters (A–Z), lowercase letters (a–z), digits (0–9) and the underscore character ("_"). If the string contains spaces it must be enclosed in double quotes. It is case-sensitive.
- *ipadd* is an IP address in dotted decimal notation.
- *port-number* is a port number in the range 0 to 65535.

Description This command adds a RADIUS server to the list of known RADIUS servers. RADIUS servers are used for user authentication.

The SERVER parameter specifies the IP address of the RADIUS server, in dotted decimal notation. The server must not already be in the list of known RADIUS servers. If SERVER is specified, but PORT and ACCPORT are not, then the RADIUS server is used for both authentication and accounting, and requests are sent to the default ports (1645 and 1646). Use the PORT and ACCPORT parameters to prevent the RADIUS server being used for authentication or accounting, or to specify a different port number to use.

The SECRET parameter specifies a shared secret used in communications between the router and the RADIUS server. The secret is used by the router to encrypt the password field in authentication requests sent to the RADIUS server, and by the RADIUS server to authenticate the router's request. The secret is case-sensitive.

The PORT parameter specifies a non-standard port number for communication with the RADIUS server. Setting the port number to zero means that the server will not be used for RADIUS authentication (it may only be required for RADIUS accounting).

The ACCPORT parameter specifies a port number for communication with the RADIUS server running RADIUS accounting (RFC 2139). Setting the port number to zero means that the server will not be used for RADIUS accounting (it may only be required for RADIUS authentication).

By default the RADIUS server uses port number 1645 to connect to RADIUS servers for authentication, and port number of 1646 for RADIUS accounting. The RADIUS accounting port is not the official port number (1813) but is the port number used by a number of commonly available packages.

Examples To add a RADIUS server with an IP address of 192.168.17.11 and "Valid8Me" as the shared secret, use the command:

```
ADD RADIUS SERVER=192.16817.11 SECRET=Valid8Me
```

To add a RADIUS server for accounting only, with an IP address of 192.168.17.12 and "Valid8Me" as the shared secret, use the command:

```
ADD RADIUS SERVER=192.16817.11 SECRET=Valid8Me PORT=0
    ACCPORT=1813
```

See Also DELETE RADIUS SERVER
SHOW RADIUS

ADD TACACS SERVER

Syntax

```
ADD TACACS SERVER=ipadd
```

where:

- *ipadd* is an IP address in dotted decimal notation.

Description This command adds a TACACS server to the list of TACACS servers used for authenticating login names.

The SERVER parameter specifies the IP address of the server in dotted decimal notation. An unlimited number of TACACS servers may be defined, although two or three would be a sensible maximum number.

Examples To add a TACACS server with the IP address 172.16.8.5 use the command:

```
ADD TACACS SERVER=172.16.8.5
```

See Also DELETE TACACS SERVER
SHOW TACACS SERVER

ADD USER

Syntax

```
ADD USER=login-name PASSWORD=password
    [CALLINGNUMBER=number] [CBNUMBER=e164number]
    [DESCRIPTION=description] [PRIVILEGE={USER|MANAGER|
    SECURITYOFFICER}] [TELNET={YES|NO}] [IPADDRESS=ipadd]
    [IPXNETWORK=network] [NETMASK=ipadd] [MTU=40..1500]
```

where:

- *login-name* is a character string, 1 to 64 characters in length. Valid characters are uppercase letters (A–Z), lowercase letters (a–z), and decimal digits (0–9). The string may not contain spaces.
- *password* is a character string, 1 to 32 characters in length. Valid characters are any printable character. If the string contains spaces it must be enclosed in double quotes.
- *number* is an ISDN phone number, 1 to 32 characters in length. Valid characters are any printable characters. If the string contains spaces it must be enclosed in double quotes.
- *e164number* is a valid phone number. It may contain digits (0–9) and should be a valid phone number as described in CCITT standard E.164.
- *description* is a character string, 1 to 23 characters in length. Valid characters are any printable character. If the string contains spaces it must be enclosed in double quotes.

- *ipadd* is an IP address in dotted decimal notation.
- *network* is a valid Novell network number, expressed as a hexadecimal number. Leading zeros may be omitted.

Description This command adds a user to the User Authentication Database. The USER parameter specifies the login name for the user. It is case insensitive.

The PASSWORD parameter specifies the password for the user. The password is case sensitive. It is intended that the PASSWORD parameter be used to set an initial password for the user and that the user will change it to some string known only to the user, using the SET PASSWORD command on page 1-89. A password set with the SET PASSWORD command may contain any printing character. A configurable minimum password length is enforced. The default is 6 characters.

The CALLINGNUMBER parameter specifies the calling number to be used to authenticate incoming calls from L2TP and ISDN services that provide caller ID information. While any printable characters will be accepted for this parameter, the calling number it is to match is likely to contain only decimal digits. Any other characters used in this parameter are unlikely to match the calling number of an incoming call.

The CBNUMBER parameter specifies the ISDN phone number to use when making a call back to a remote user using the PPP callback facility.

The DESCRIPTION parameter specifies a descriptive text for the entry, such as the full name and location of the user. This string may contain any printing character and the case is preserved in output.

The PRIVILEGE parameter specifies the privilege level for the user. The default is USER. A user with USER privilege has access to only a limited subset of commands, generally commands that only affect the user’s own session or asynchronous port. A user with MANAGER privilege has access to the complete router command set when the router is operating in normal mode, or a subset of commands when the router is operating in security mode. A user with SECURITY OFFICER privilege has access to the full set of commands, and in particular, can access security commands while the router is operating in security mode.

The TELNET parameter specifies whether or not the user is permitted to use the TELNET command on page 11-24 of *Chapter 11, Terminal Server* to Telnet to another host, or the CONNECT command on page 11-13 of *Chapter 11, Terminal Server* to access a Telnet service when logged in via Telnet.

The IPADDRESS parameter specifies an IP address for the user. The value must be a valid IP address in dotted decimal form.

The IPXNETWORK parameter specifies the Novell network number assigned to the user accessing a Novell internetwork. See *Chapter 18, Asynchronous Call Control* for more information. The network number may be cleared by setting IPXNETWORK to NONE instead of a network number. The default is NONE.

The NETMASK parameter specifies an IP network mask for the user. The value must be a valid IP address in dotted decimal form.

The MTU parameter specifies a Maximum Transmission Unit value for the user. The value must be a decimal integer in the range 40 to 1500 inclusive.

The IPADDRESS, NETMASK and MTU parameters are only required if the user is to login in order to make a PPP or SLIP connection to the router over a modem connected to an asynchronous port.

Examples To add a user with the login name "BRUCE", the password "sbfd4Q" and MANAGER privilege, use the command:

```
ADD USER=BRUCE DESCRIPTION="Bruce Wilson" PASSWORD=sbfd4Q
   PRIVILEGE=MANAGER
```

To add a user with the login name "ACCOUNTS", the password "Cash4Cast", and USER privilege, and specify an IP address, network mask and MTU so that the user can make SLIP connection to the router, use the command:

```
ADD USER=ACCOUNTS DESCRIPTION="Accounting Data Entry"
   PASSWORD=Cash4Cast PRIVILEGE=USER IPADDRESS=192.168.35.17
   NETMASK=255.255.255.0 MTU=1500
```

To add a user with the login name "CIPHER", password "sbr4y3" and SECURITY OFFICER privilege, use the command:

```
ADD USER="CIPHER" PASSWORD="sbr4y3" PRIVILEGE=SECURITYOFFICER
```

See Also DELETE USER
DISABLE SYSTEM SECURITY_MODE
DISABLE USER
ENABLE SYSTEM SECURITY_MODE
ENABLE USER
PURGE USER
RESET USER
SET USER
SHOW USER

ADD USER RSO

Syntax `ADD USER RSO IP=`*`ipadd`*` [MASK=`*`ipadd`*`]`

where:

- *ipadd* is an IP address in dotted decimal notation.

Description This command adds a Remote Security Officer address and mask to the remote access user list. The entire range of addresses defined by the combined IP address and mask become eligible for Remote Security Officer access.

The IP parameter specifies the base IP address for this range of Remote Security Officer addresses. All base IP addresses defined with successive use of this command should be unique, since the base IP address is used to identify the Remote Security Officer access entry.

The MASK parameter specifies the address mask which extends the range of IP addresses. If the mask parameter is not present a mask of 255.255.255.255 is used. The address and mask must be internally consistent in that the result of ANDing the address and mask should be the address.

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

Examples To add the IP addresses 192.168.11.7 and 192.168.202.9 as Remote Security Officers, use the commands:

```
ADD USER RSO IP=192.168.11.7
ADD USER RSO IP=192.168.202.9
```

See Also DELETE USER RSO
DISABLE USER RSO
ENABLE USER RSO
SHOW USER RSO

CLEAR FLASH TOTALLY

Syntax `CLEAR FLASH TOTALLY`

Description This command completely clears the FLASH memory to an erased state. Clearing the FLASH memory is not required for normal operation. This command intended as a troubleshooting tool to allow the FLASH file system to be returned to a known state.

This command will destroy all existing files and reformat the FLASH memory. Files cannot be salvaged after the FLASH memory has been erased.

While the erasure is under way the SHOW FLASH command on page 1-108 will indicate that the FFS global operation is in the “erasing” state. When the erasure is complete a message is displayed and the global operation returns to “none”.

The operation of erasing FLASH may take up to a minute to complete.

See Also SHOW FLASH

CREATE CONFIG

Syntax `CREATE CONFIG=`*`filename`*

where:

- *filename* is a file name of the form `device:filename.ext`. Valid characters are the lowercase letters (a–z), digits (0–9) and the hyphen character (-). Wildcards are not allowed.

Description This command creates a script file containing the commands required to recreate the current dynamic configuration of the router.

The CONFIG parameter specifies the name of the script or configuration file to create. The file extension must be “`scp`” or “`cfg`”. If the file already exists, it is replaced. If the file does not exist it is created.

☞ *The CREATE CONFIG command on page 1-49 writes the MD5 digest, not the cleartext, of passwords in commands to the configuration file. When a configuration script is executed the command processor can determine whether the password value is cleartext or an MD5 digest.*

☞ *The configuration of a specific software module can not be saved with this command. To save the configuration of a specific software module, use the SHOW CONFIG command on page 1-98 to display the configuration, capture the output and save it to a file.*

☞ *For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.*

Examples To save the current dynamic configuration as the default boot script `boot.cfg`, use the command:

```
CREATE CONFIG=BOOT.CFG
```

See Also RESTART
SET CONFIG
SHOW CONFIG

CREATE FFILE

Syntax

```
CREATE FFILE=filename {DATA=bytes|ADDRESS=address
    LENGTH=length}
```

where:

- *filename* is a file name of the form `device:filename.ext`. Valid characters are the lowercase letters (a–z), digits (0–9) and the hyphen character (-). Wildcards are not allowed.
- *bytes* is a comma-separated list of up to 80 byte values, expressed as hexadecimal numbers.
- *address* is a memory address, expressed as a hexadecimal number.
- *length* is a length in bytes, expressed as a hexadecimal number.

Description This command is used to create an FFS file. It is intended primarily for testing purposes, and should not be required during normal operation. There are two variants of the command. The first variant is used to create small files, and the DATA parameter specifies the bytes to be written to the file. The second variant is used to create larger files by copying data from elsewhere in the router’s memory space. The ADDRESS parameter specifies the source address in memory and the LENGTH parameter specifies the number of bytes to copy to the new file, starting at the specified address.

Care must be taken when using this command to avoid creating an invalid file which a module will then try to use. If a module recognises the file name it may try to use the file, with unpredictable results if the file contents are not in the expected format.

Do not use this command unless specifically instructed to do so by your distributor or reseller.

Examples To create a file called FLASH:TINY.FIL containing the five bytes 0xCD, 0x20, 0x5, 0x7F and 0x28, use the command:

```
CREATE FFILE=FLASH:TINY.FIL DATA=CD,20,5,7F,28
```

To create a file called FLASH:BIG.FIL, of length 0xC0000, from the contents of memory starting at address 0x00, use the command:

```
CREATE FFILE=FLASH:BIG.FIL ADDRESS=0 LENGTH=C0000
```

See Also DELETE FFILE
SHOW FFILE

DELETE ALIAS

Syntax `DELETE ALIAS=`*`name`*

Where:

- *name* is a character string 1 to 132 characters in length. It may contain any printable character. If *name* contains spaces it must be enclosed in double quotes. It is case-sensitive.

Description This command deletes an existing alias. Occurrences of the alias string in the command line will no longer be expanded to the substitution text.

The ALIAS parameter specifies the name of the alias to be deleted.

Example To delete an alias with name “ii”, use the command:

DELETE ALIAS=ii

See Also ADD ALIAS
SHOW ALIAS

DELETE FFILE

Syntax DELETE FFILE=*filename*

where:

- *filename* is a file identifier of the form `device:filename.ext`. Valid characters are the lowercase letters (a–z), digits (0–9) and the hyphen character (-). Wildcards are allowed in the name and extension elements.

Description This command deletes an FFS file. Wildcards are allowed in the name and type elements of the file identifier.

Caution must be taken when deleting files, such as patches, releases, licences and configurations, since they contain information which is vital to the intended operation of the router.

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

Examples To delete the file FLASH:28-68.REL, use the command:

```
DELETE FFILE=FLASH:28-68.rel
```

To delete all files in FLASH, use the command:

```
DELETE FFILE=FLASH:*.*
```

See Also CREATE FFILE
SHOW FFILE

DELETE FILE

Syntax DELETE FILE=*filename*

where:

- *filename* is a file identifier of the form `[device:]name.ext`. Valid characters are the lowercase letters (a–z), digits (0–9) and the hyphen character (-). Wildcards are allowed in the name and extension elements.

Description This command deletes the specified file or files. Wildcards are allowed in the name and extension elements of the file identifier.

Caution must be taken when deleting files, such as patches, releases, licences and configurations, since they contain information which is vital to the intended operation of the router.

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

Examples To delete all the patch files on the router, use the command:

```
DELETE FILE=*:*.PAT
```

To delete the release file 28-72.REL, use the command:

```
DELETE FILE=28-72.REL
```

See Also RENAME
SHOW FILE

DELETE INSTALL

Syntax

```
DELETE INSTALL={TEMPORARY|PREFERRED|DEFAULT}
```

Description This command deletes the specified install from the install information. In the case of the default install, only the patch information is deleted, as the release information must always be left intact in the default install.

The INSTALL module is responsible for maintaining install information and loading the correct install at boot. An *install* is a record identifying a release and an optional patch. Three installs are maintained by the INSTALL module, *temporary, preferred* and *default*.

The default install is the install of last resort. The release for the default install can not be changed by the manager and is always the EPROM release. The patch for the default install may be set by the manager.

The temporary and preferred installs are completely configurable. Both the release and an associated patch may be set. The release may be EPROM or a release stored in FFS.

Examples To delete the temporary install, use the command:

```
DELETE INSTALL=TEMPORARY
```

See Also SET INSTALL
SHOW INSTALL

DELETE MAIL

Syntax DELETE MAIL=*id*

where:

- *id* is a hexadecimal number in the range 0x0 to 0xffff.

Description This command deletes the specified mail message from the transmission queue.

The MAIL parameter specifies the message id of the mail message to be deleted. The message id can be determined from the output of the SHOW SHOW MAIL command on page 1-116.

Examples To delete the mail message with a message id of 0x231b, use the command:

```
DELETE MAIL=231b
```

See Also MAIL
SHOW MAIL

DELETE RADIUS SERVER

Syntax DELETE RADIUS SERVER=*ipadd*

where:

- *ipadd* is an IP address in dotted decimal notation.

Description This command deletes a RADIUS server from the list of known RADIUS servers. RADIUS servers are used for user authentication.

The SERVER parameter specifies the IP address of the RADIUS server, in dotted decimal notation. The server must be in the list of known RADIUS servers.

Examples To delete the RADIUS server with the IP address of 192.168.17.11, use the command:

```
DELETE RADIUS SERVER=192.168.17.11
```

See Also ADD RADIUS SERVER
SHOW RADIUS

DELETE TACACS SERVER

Syntax

```
DELETE TACACS SERVER=ipadd
```

where:

- *ipadd* is an IP address in dotted decimal notation.

Description

This command deletes a TACACS server from the list of TACACS servers used for authenticating login names. The SERVER parameter specifies the IP address of the server in dotted decimal notation.

Examples

To delete the TACACS server with the IP address 172.16.8.5 use the command:

```
DELETE TACACS SERVER=172.16.8.5
```

See Also

ADD TACACS SERVER
SHOW TACACS SERVER

DELETE USER

Syntax

```
DELETE USER=login-name
```

where:

- *login-name* is a character string, 1 to 64 characters in length. Valid characters are uppercase letters (A–Z), lowercase letters (a–z), and decimal digits (0–9). The string may not contain spaces.

Description

This command deletes a user from the User Authentication Database. The USER parameter specifies the login name for the user. It is case insensitive.

If the router is operating in security mode, you cannot delete every user with SECURITY OFFICER privilege. At least one user with SECURITY OFFICER privilege must exist in the User Authentication Database for the router to operate in security mode.

See Also

ADD USER
DISABLE USER
ENABLE USER
PURGE USER
RESET USER
SET USER
SHOW USER

DELETE USER RSO

Syntax `DELETE USER RSO IP=`*`ipadd`*

where:

- *ipadd* is an IP address in dotted decimal notation.

Description This command deletes a Remote Security Officer address range from the remote access user list. Remote Security Officers who currently have SECURITY OFFICER privilege will lose SECURITY OFFICER privilege immediately.

The IP parameter specifies the base IP address for this range of Remote Security Officer addresses.

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

Examples To delete the IP address 192.168.11.7 from the list of Remote Security Officers, use the command:

```
DELETE USER RSO IP=192.168.11.7
```

See Also ADD USER RSO
DISABLE USER RSO
ENABLE USER RSO
SHOW USER RSO

DESTROY PATCH

Syntax `DESTROY PATCH=`*`name`*

where:

- *name* is the name of a patch file.

Description This command deletes a patch file stored in NVS. Patch files stored in FLASH must be deleted with the DELETE FILE command on page 1-52.

Examples To delete the patch `COMMON.PAT` from NVS, use the command:

```
DESTROY PATCH=COMMON.PAT
```

See Also DELETE FILE
LOAD
SHOW PATCH

DISABLE FEATURE

Syntax

```
DISABLE FEATURE={featurename|index}
```

where:

- *featurename* is a character string, 1 to 12 characters in length. Valid characters are any printable character.
- *index* is a decimal number in the range 1 to the number of special feature licences.

Description

This command disables the specified special feature licence. The FEATURE parameter specifies either the name assigned to the special feature when it was enabled with the ENABLE FEATURE command on page 1-65, or the index number of the special feature as displayed in the output of the SHOW FEATURE command on page 1-104. The special feature must exist on the router and currently be enabled.

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

Examples

To disable the special feature licence “Triple DES”, use the command:

```
DISABLE FEATURE=”Triple DES”
```

To disable the special feature licence with index 2, use the command:

```
DISABLE FEATURE=2
```

See Also

ENABLE FEATURE
SHOW FEATURE

DISABLE HTTP DEBUG

Syntax

```
DISABLE HTTP DEBUG={ALL|AUTH|MSG|SESSION}
```

Description

This command disables HTTP server debugging. Debug output is sent to the terminal session or Telnet connection from which the command was entered.

The DEBUG parameter specifies the type of debugging to be disabled. If AUTH is specified, debugging of authentication attempts is disabled. If MSG is specified, debugging of HTTP GET and SET requests and responses, is disabled. If SESSION is specified, debugging of TCP state changes and session activity is disabled. If ALL is specified, all debugging is disabled. Debugging is disabled by default.

Examples

To disable HTTP server debugging, use the command:

```
DISABLE HTTP DEBUG
```

See Also

DISABLE HTTP SERVER
ENABLE HTTP DEBUG
ENABLE HTTP SERVER
RESET HTTP SERVER
SHOW HTTP CLIENT
SHOW HTTP DEBUG
SHOW HTTP SERVER
SHOW HTTP SESSION

DISABLE HTTP SERVER

Syntax

```
DISABLE HTTP SERVER
```

Description

This command disables the HTTP server. The HTTP server serves HTML pages out of the router's FLASH memory to a web browser, and allows users to login into the router. The server is enabled by default.

Examples

To disable the HTTP server, use the command:

```
DISABLE HTTP SERVER
```

See Also

DISABLE HTTP DEBUG
ENABLE HTTP DEBUG
ENABLE HTTP SERVER
RESET HTTP SERVER
SHOW HTTP CLIENT
SHOW HTTP DEBUG
SHOW HTTP SERVER
SHOW HTTP SESSION

DISABLE MAIL DEBUG

Syntax

```
DISABLE MAIL DEBUG
```

Description

This command disables the display of debugging information for mail. By default debugging is disabled.

Examples

To disable the display of debugging information for mail, use the command:

```
DISABLE MAIL DEBUG
```

See Also

ENABLE MAIL DEBUG
SHOW MAIL

DISABLE RELEASE

Syntax

```
DISABLE RELEASE=release-name
```

where:

- *release-name* is the name of a release file, of the form `device:filename.ext`. Valid characters are the lowercase letters (a–z), digits (0–9) and the hyphen character (-). Wildcards are not allowed.

Description

This command removes the licence for the specified release file.

The RELEASE parameter specifies the name of the release file. If the device field is not specified, the default is `FLASH`.

Examples

To disable release 28-761.rel, use the command:

```
DISABLE RELEASE=28-761.REL
```

See Also

ENABLE RELEASE
SHOW RELEASE

DISABLE SYSTEM SECURITY_MODE

Syntax

```
DISABLE SYSTEM SECURITY_MODE
```

Description

This command disables security mode on the router. When the router is operating in security mode, a subset of router commands, called the security commands, require SECURITY OFFICER privilege to execute. Sensitive data files such as encryption key files can only be stored in the router's file subsystem when the router is in security mode.

When security mode is disabled, all sensitive data files (e.g. encryption key files) are deleted from the router's file subsystem.

Security mode should be enabled on any router that is fitted with a hardware encryption device or is configured to provide secure features like encryption, authentication or Secure Shell.

Examples

To disable security mode, use the command:

```
DISABLE SYSTEM SECURITY_MODE
```

See Also

ADD USER
ENABLE SYSTEM SECURITY_MODE
SET USER
SHOW SYSTEM
SHOW USER

DISABLE USER

Syntax

```
DISABLE USER=login-name
```

where:

- *login-name* is a character string, 1 to 64 characters in length. Valid characters are uppercase letters (A–Z), lowercase letters (a–z), and decimal digits (0–9). The string may not contain spaces.

Description

This command temporarily disables a user login name. The login name must be currently enabled. The USER parameter specifies the login name for the user. It is case insensitive. Login attempts using the login name will be ignored and TACACS servers will not be consulted.

See Also

ADD USER
DELETE USER
ENABLE USER
PURGE USER
RESET USER
SET USER
SHOW USER

DISABLE USER RSO

Syntax

```
DISABLE USER RSO
```

Description

This command disables Remote Security Officer access. Remote Security Officers who currently have SECURITY OFFICER privilege will loose SECURITY OFFICER privilege immediately.

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

Examples

To disable Remote Security Officer access, use the command:

```
DISABLE USER RSO
```

See Also

ADD USER RSO
DELETE USER RSO
ENABLE USER RSO
SHOW USER RSO

DUMP

Syntax

```
DUMP [ADDR=address] [LEN=length] [SIZE={BYTE|LONG|WORD}]
    [SPACE={SD|SP|UD|UP|UR}]
```

where:

- *address* is the first address (in hexadecimal) to be dumped.
- *length* is the number of bytes (in hexadecimal) to dump.

Description

This command displays the contents of the router's memory. The block of memory to be displayed is specified by the parameters ADDR, LEN and SPACE. The parameter SPACE specifies which of the possible CPU address spaces is to be dumped (Table 1-9 on page 1-61)

Table 1-9: Router CPU address spaces.

SPACE value	CPU address space
UD	User Data
UP	User Program
UR	User Reserved
SD	Supervisor Data
SP	Supervisor Program

The SIZE parameter specifies whether the data should be displayed grouped as BYTEs, LONGWORDs or WORDs. Note that LEN is always in bytes, regardless of the value of SIZE.

If the LEN, SIZE or SPACE parameters are omitted then they default to the value they had at the previous invocation of the command. If the ADDR parameter is omitted it will increment to dump the block of memory immediately following the block dumped by the previous invocation. If the ADDR parameter is given without a value (e.g. just the string ADDR or ADDR=) then it will dump the block of memory previously dumped.

It is possible to use this command to dump I/O devices. This may interrupt the operation of the router. The DUMP command is provided mainly as a diagnostic tool. It should not be needed for normal operation of the router.

A typical display is shown in Figure 1-6 on page 1-62. The left-hand column shows the address of the data in each row. The next eight columns give the data starting at the address for the next 16 bytes. The right-most column is an ASCII representation of the data in the row, with non-printing characters represented by a dot.

Figure 1-6: Example output from the DUMP command.

```
00000000  0001 667c 0001 667c 0000 b424 0001 667c          ..f|..f|...$..f|
00000010  0001 667c 0001 667c 0001 667c 0001 667c          ..f|..f|..f|..f|
00000020  0001 667c 0001 667c 0001 667c 0001 667c          ..f|..f|..f|..f|
00000030  0001 667c 0001 667c 0001 667c 0001 667c          ..f|..f|..f|..f|
00000040  0001 667c 0001 667c 0001 667c 0001 667c          ..f|..f|..f|..f|
00000050  0001 667c 0001 667c 0001 667c 0001 667c          ..f|..f|..f|..f|
00000060  0001 66d4 0001 6b14 0001 667c 0001 667c          ..f|..f...k...f|
00000070  0001 667c 0001 1308 0001 6aa4 0001 66c8          ..f|......j...f.
00000080  0001 667c 0001 667c 0001 667c 0001 667c          ..f|..f|..f|..f|
00000090  0001 667c 0001 667c 0001 667c 0001 667c          ..f|..f|..f|..f|
000000a0  0001 667c 0001 667c 0001 667c 0001 667c          ..f|..f|..f|..f|
000000b0  0001 667c 0001 667c 0001 667c 0001 667c          ..f|..f|..f|..f|
000000c0  0001 667c 0001 667c 0001 667c 0001 667c          ..f|..f|..f|..f|
000000d0  0001 667c 0001 667c 0001 667c 0001 667c          ..f|..f|..f|..f|
000000e0  0001 667c 0001 667c 0001 667c 0001 667c          ..f|..f|..f|..f|
000000f0  0001 667c 0001 667c 0001 667c 0001 667c          ..f|..f|..f|..f|
```

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

Examples The command used to produce the output shown above was:

```
DUMP ADDR=0 LEN=100 SIZE=WORD SPACE=SD
```

See Also MODIFY

EDIT

Syntax `EDIT [`*`filename`*`]`

where:

- *filename* is a file name of the form `device:filename.ext`. Valid characters are the lowercase letters (a–z), digits (0–9) and the hyphen character (-). Wildcards are not allowed.

Description This command invokes the router’s built-in full-screen text editor to edit an ASCII text file. If a filename is specified then the editor will load the file if it exists on the system. If the device field is not specified, the default is `FLASH`.

The editor uses VT100 command sequences (Table 1-10 on page 1-63) and should only be used with a VT100-compatible terminal, terminal emulation program or Telnet client.

Table 1-10: Editor functions and keystrokes.

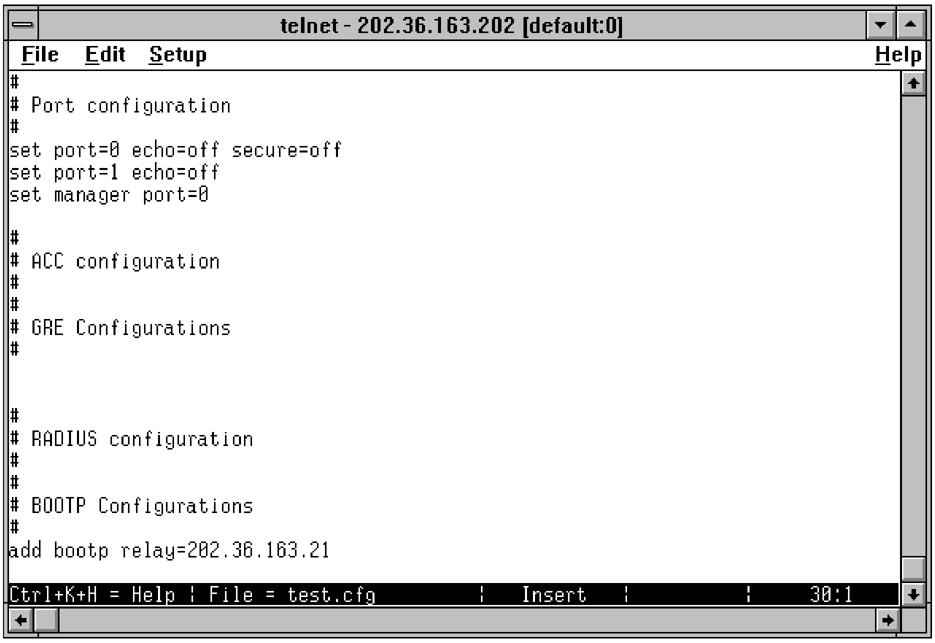
Cursor Movement		**Deletion**	
↑ or Ctrl/Z	Up one line	Ctrl/T	Delete word right
↓ or Ctrl/X	Down one line	Ctrl/Y	Delete line
→	Right one character		
←	Left one character	**Block Operations**	
Ctrl/B	Start of file	Ctrl/K,B	Begin block mark
Ctrl/D	End of file	Ctrl/K,D	Unmark block
Ctrl/A	Start of line	Ctrl/K,U	Cut block to buffer
Ctrl/E	End of line	Ctrl/K,C	Copy block to buffer
Ctrl/U	Up one screen	Ctrl/K,V	Paste block from buffer
Ctrl/V	Down one screen	Ctrl/K,Y	Delete block
Ctrl/F	Word right		

Search		**Exit**	
Ctrl/K,F	Find text	Ctrl/K,X	Exit editor; save file
Ctrl/L	Repeat last find	Ctrl/C	Quit editor; don’t save file

Miscellaneous			
Ctrl/I	Insert mode	Ctrl/O	Overstrike mode
Ctrl/W	Refresh the screen	Ctrl/K,H	Display help screen
Ctrl/K,O	Open a file		

The VT100 screen only supports 24 lines, unlike a PC. Lines 1–23 are used to display the text of the file being edited, and line 24 is used as the status bar and command line (Figure 1-7 on page 1-64). The status bar displays the current file name, line and column position in the file and the editing mode (overstrike or insert). When additional command information is required, such as a file name or search text, then a prompt is displayed in the status bar.

Figure 1-7: The editor screen layout.



```
#
# Port configuration
#
set port=0 echo=off secure=off
set port=1 echo=off
set manager port=0

#
# ACC configuration
#
#
# GRE Configurations
#


#
# RADIUS configuration
#
#
# BOOTP Configurations
#
add bootp relay=202.36.163.21
Ctrl+K+H = Help ¦ File = test.cfg     ¦   Insert   ¦         ¦   30:1
```

The editor is invoked with the command:

```
EDIT [filename]
```

The file name is optional as a file can be loaded, or a new file can be created from within the editor itself. The editor is currently limited to editing one file at a time. To overcome this limitation use the cut and paste facility to transfer text between files.

Before starting the editor make sure your terminal, terminal emulation program or Telnet client is 100% compatible with a VT100 terminal.

Help can be obtained at any time while in the editor by pressing [Ctrl/K,H]; that is, holding down the Ctrl key and pressing in turn the K key then the H key.

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

Examples To edit a file called NVS:SHOW SCP, use the command:

```
EDIT NVS:SHOW.SCP
```

See Also DELETE FILE
LOAD
SHOW FILE

ENABLE FEATURE

Syntax ENABLE FEATURE=*featurename* PASSWORD=*password*

where:

- *featurename* is a character string, 1 to 12 characters in length. Valid characters are any printable character.
- *password* is a character string, at least 16 characters in length. Valid characters are hexadecimal characters (0–9, a–f, A–F).

Description This command enables the special feature licence identified by the special feature licence name and password.

The FEATURE parameter specifies a user-defined name for the special feature licence that appears in the output of the SHOW FEATURE command on page 1-104 and is used to identify the special feature licence in other commands.

The PASSWORD parameter specifies the password for the special feature licence. The password identifies the special feature(s) being licenced, the licence type (30-day trial licence or full licence) and the router serial number. The password information is stored in the router’s FLASH memory.

> *For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.*

Examples To enable the special feature licence “Triple DES” with password “591a9d5d9b2e8969cbf7”, use the command:

```
ENABLE FEATURE=”3DES” PASSWORD=”591a9d5d9b2e8969cbf7”
```

See Also DISABLE FEATURE
SHOW FEATURE

ENABLE HTTP DEBUG

Syntax ENABLE HTTP DEBUG={ALL|AUTH|MSG|SESSION}

Description This command enables HTTP server debugging. Debug output is sent to the terminal session or Telnet connection from which the command was entered.

The DEBUG parameter specifies the type of debugging to be enabled. If AUTH is specified, debugging of authentication attempts is enabled. If MSG is specified, debugging of HTTP GET and SET requests and responses, is enabled. If SESSION is specified, debugging of TCP state changes and session activity is enabled. If ALL is specified, all debugging is enabled. To enable combinations of debugging options, enter multiple commands. Debugging is disabled by default.

Examples To enable debugging of authentication attempts and HTTP GET/SET messages, use the commands:

```
ENABLE HTTP DEBUG=AUTH

ENABLE HTTP DEBUG=MSG
```

See Also DISABLE HTTP DEBUG
DISABLE HTTP SERVER
ENABLE HTTP SERVER
RESET HTTP SERVER
SET HTTP SERVER
SHOW HTTP CLIENT
SHOW HTTP DEBUG
SHOW HTTP SERVER
SHOW HTTP SESSION

ENABLE HTTP SERVER

Syntax `ENABLE HTTP SERVER`

Description This command enables the HTTP server. The HTTP server serves HTML pages out of the router's FLASH memory to a web browser, and allows users to login into the router. The server is enabled by default.

Examples To enable the HTTP server, use the command:

```
ENABLE HTTP SERVER
```

See Also DISABLE HTTP DEBUG
DISABLE HTTP SERVER
ENABLE HTTP DEBUG
RESET HTTP SERVER
SET HTTP SERVER
SHOW HTTP CLIENT
SHOW HTTP DEBUG
SHOW HTTP SERVER
SHOW HTTP SESSION

ENABLE MAIL DEBUG

Syntax `ENABLE MAIL DEBUG`

Description This command enables the display of debugging information for mail. When debugging is enabled, messages recording the progress of email messages are displayed to the terminal from which the command was entered. By default debugging is disabled.

Examples To enable mail debug, use the command:

```
ENABLE MAIL DEBUG
```

See Also DISABLE MAIL DEBUG
SHOW MAIL

ENABLE RELEASE

Syntax

```
ENABLE RELEASE=release-name [PASSWORD=password]
   NUMBER=release-number
```

where:

- *release-name* is the name of a release file, of the form `device:filename.ext`. Valid characters are the lowercase letters (a–z), digits (0–9) and the hyphen character (-). Wildcards are not allowed.
- *password* is the password to licence this release, expressed as a string of hexadecimal characters (A–F, 0–9). It is not case sensitive.
- *release-number* is the release number for this release.

Description This command enables a release file in the router.

The RELEASE parameter specifies the name of the release file. If the device field is not specified, the default is `FLASH`.

The PASSWORD parameter specifies the password for this release, encoded as a sequence of hexadecimal digits. The password is supplied by your distributor or reseller, and is specific to a particular release and router serial number. The password enables the release with either a full licence or a 30-day licence.

If the PASSWORD parameter is not present, the router looks for a reason to be able to generate a password for this release. Valid reasons include the router EPROMs having the same major and minor version numbers as the release being licenced, or a valid release licence being found with the same major and minor version numbers as the release being licenced. If either of these reasons is found the router will generate a password internally, otherwise the command will not complete. If the EPROMs or a valid FULL release licence are found to provide the reason for generating a release licence, a FULL licence will be generated. If the only valid release licences found are 30 day trial licences, a 30 day trial licence will be generated.

The NUMBER parameter specifies the software release for the release file being licenced. This is entered in dotted decimal form, like “7.6.1”.

To enable a release for Software Release 7.6.0 or later on a router running Software Release 7.4 or earlier, the following procedure must be used:

1. If the interim release number of the release being enabled is "0" (for example, release 7.6.0), enter the release number without the interim release number (e.g. NUMBER=7.6).
2. If the interim release number is not "0" (for example, 7.6.1), enter the release number as two numbers, the first number being the major release number and the second number being 65536*<*interim-number*>+<*minor-number*>. For example, for release 7.6.1, enter NUMBER=7.65542)."

Examples

To enable release 28-761.rel with the password CE645398FBE for software release 7.6.1, use the command:

```
ENABLE RELEASE=28-761.REL PASSWORD=CE645398FBE NUMBER=7.6.1
```

See Also

DISABLE RELEASE
SHOW RELEASE

ENABLE SYSTEM SECURITY_MODE

Syntax

```
ENABLE SYSTEM SECURITY_MODE
```

Description

This command enables security mode on the router. When the router is operating in security mode, a subset of router commands, called the security commands, require SECURITY OFFICER privilege to execute. Sensitive data files such as encryption key files can only be stored in the router's file subsystem when the router is in security mode.

Security mode should be enabled on any router that is fitted with a hardware encryption device or is configured to provide secure features like encryption, authentication or Secure Shell.

> *If the router is operating in security mode, SECURITY OFFICER privilege is required to execute many commands. Security mode can not be enabled unless at least one user with SECURITY OFFICER privilege exists in the User Authentication Database.*

Examples

To enable security mode, use the command:

```
ENABLE SYSTEM SECURITY_MODE
```

See Also

ADD USER
DISABLE SYSTEM SECURITY_MODE
SET USER
SHOW SYSTEM
SHOW USER

ENABLE USER

Syntax

```
ENABLE USER=login-name
```

where:

- *login-name* is a character string, 1 to 64 characters in length. Valid characters are uppercase letters (A–Z), lowercase letters (a–z), and decimal digits (0–9). The string may not contain spaces.

Description

This command enables a user login name that has been disabled. The USER parameter specifies the login name for the user. It is case insensitive. Login attempts using the login name will be processed as normal.

See Also

ADD USER
DELETE USER
DISABLE USER
PURGE USER
RESET USER
SET USER
SHOW USER

ENABLE USER RSO

Syntax

```
ENABLE USER RSO
```

Description

This command enables Remote Security Officer access. Authorised IP addresses must be added with the ADD USER RSO command on page 1-48 before Remote Security Officer access can be used.

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

Examples

To enable Remote Security Officer access, use the command:

```
    ENABLE USER RSO
```

See Also

ADD USER RSO
DELETE USER RSO
DISABLE USER RSO
SHOW USER RSO

HELP

Syntax

```
HELP [topic]
```

where:

- *topic* is a topic to display.

Description

This command displays online help for commands. If a topic is not specified, a list of available topics is displayed. If a topic is specified, and is available, a list of commands relating to the topic is displayed.

The system help file must be assigned using the SET HELP command on page 1-80.

Examples

To get help on OSPF, use the command:

```
    HELP OSPF
```

See Also

SET HELP
SHOW SYSTEM

LOAD

Syntax

```
LOAD [METHOD=TFTP] [DELAY=delay] [DESTINATION={FLASH|NVS}]
   [FILE=filename] [SERVER={hostname|ipadd}]

LOAD [METHOD={HTTP|WEB|WWW}] [DELAY=delay]
   [DESTINATION={FLASH|NVS}] [FILE=filename]
   [HTTPPROXY={hostname|ipadd} [PROXYPORT=1..65535]]
   [SERVER={hostname|ipadd}]

LOAD [METHOD=ZMODEM] [DELAY=delay] [DESTINATION={FLASH|
   NVS}] [FILE=filename] [PORT=port]

LOAD [METHOD=NONE] [DELAY=delay] [DESTINATION={FLASH|NVS}]
   [FILE=filename] [PORT=port]
```

where:

- *delay* is a time delay, in seconds.
- *filename* is a character string, 1 to 100 characters in length. This is a full path name for the file to load in the syntax of the server from which the file will be loaded.
- *ipadd* is an IP address in dotted decimal notation.
- *hostname* is a character string, 1 to 40 characters in length.
- *port* is the number of an asynchronous port. Ports are numbered sequentially starting with port 0.

Description

This command downloads a file to the router using *Trivial File Transfer Protocol* (TFTP), *HyperText Transfer Protocol* (HTTP), ZMODEM or direct input from an asynchronous port. Any parameters not specified use the default values set with the SET LOADER command on page 1-83. Some parameters are invalid or have different meanings depending on the method used to download the file.

The DELAY parameter specifies the delay, in seconds, between initiating the file download and the download actually starting. This feature is provided to allow reconfiguration of ports and devices after initiating the download. For example, a manager may be at a remote site with a single PC which is to act as both the access device to the router and the TFTP server. By specifying a delay, the manager has time to reconfigure the PC from terminal emulation mode to TFTP server mode before the download starts. The DELAY parameter is optional.

The DESTINATION parameter specifies where the file will be stored. If NVS is specified, the file is stored in the battery backed non-volatile storage on the router. Only patch files and script files can be stored in NVS due to the size limitations of NVS. If FLASH is specified, the file is stored in the FLASH File System (FFS) on the router. Patch files, release files and script files may be stored in FLASH. If DESTINATION is not specified, and has not been set with the SET LOADER command on page 1-83, the default is FLASH.

The FILE parameter specifies the name of the file, in the syntax of the server from which the file will be downloaded. The FILE parameter is required unless it has been set with the SET LOADER command on page 1-83. The FILE parameter is a full path name rather than just a file name. The only restriction is that the last part of the file parameter must be a valid file name for the LOADER module. When METHOD is set to TFTP, HTTP, ZMODEM or NONE, valid file names are of the form `filename.ext` where `filename` is one to eight characters in length and `ext` is three characters in length. The following are examples of valid file names for methods TFTP, ZMODEM or NONE:

```
\user\public\filename.ext ; UNIX or DOS server
[network.cfg]filename.ext ; DEC VAX server
```

Note that, starting at the end of the file name and working backwards, the first character not valid in file names delimits a valid file name for the router. If the slash at the beginning of the path is omitted in this command, the LOAD command adds it. The following are examples of valid file names for method HTTP:

```
/path/filename.ext

path/filename.ext
```

The HTTPPROXY parameter specifies the proxy server used to handle HTTP requests. Either the IP address or the fully qualified domain name of the proxy server may be specified. If a domain name is specified the router will perform a DNS lookup to resolve the name.

The METHOD parameter specifies the method to use when downloading the file. If HTTP is specified, HTTP is used to download the file. The options WEB and WWW are synonyms for HTTP. If TFTP is specified, TFTP is used to download the file. If ZMODEM is specified, the ZMODEM protocol is used to download the file. If ZMODEM is specified, the PORT parameter must be specified, unless it has been set with the SET LOADER command on page 1-83. If NONE is specified, only text files can be downloaded and all input received via the port will be directed to the specified file on the router’s file subsystem. The file transfer is terminated by the first control character received that is not a CR or LF character. The FILE parameter is not used when METHOD is set to ZMODEM. The PORT parameter is not valid when METHOD is set to HTTP, WEB, WWW, TFTP or NONE. The default is TFTP.

The PORT parameter specifies the asynchronous port via which the file will be downloaded, when the METHOD parameter is set to ZMODEM or NONE. If METHOD is set to ZMODEM or NONE, the PORT parameter is required unless it has been set with the SET LOADER command on page 1-83.

The PROXYPORT parameter specifies the port on a proxy server. The PROXYPORT parameter is only valid if METHOD is HTTP and HTTPPROXY is specified. The default is 80.

The SERVER parameter specifies the IP address or the hostname (a fully qualified domain name) of the TFTP server or HTTP server from which the file is loaded. If a host name is specified, a DNS lookup is used to translate this to an IP address. See SET IP NAMESERVER command on page 8-118 of *Chapter 8, Internet Protocol (IP)* for more information about setting up name servers. The PING command on page 8-103 of *Chapter 8, Internet Protocol (IP)* can be used to verify that the router can communicate with the server via IP. The SERVER parameter is required if METHOD is HTTP or TFTP, unless it has been set by the SET LOADER command on page 1-83. The SERVER parameter is not valid when METHOD is set to ZMODEM or NONE. The following are examples of valid server names for method HTTP:

```
host.company.com

192.168.3.4
```

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

Examples To download a release using the default values set previously with the SET LOADER command on page 1-83, use the command:

```
LOAD
```

To download release `28-761.rel` into the FLASH File System from a TFTP server with an IP address of 172.16.8.5, with a delay of one minute, use the command:

```
LOAD FILE=28-761.REL DESTINATION=FLASH SERVER=172.16.8.5
    DELAY=60
```

To load a script called SHOW.SCP from asynchronous port 1, use the command:

```
LOAD FILE=SHOW.SCP PORT=1
```

To load the script SHOW.SCP from asynchronous port 1 using the ZMODEM protocol, use the command:

```
LOAD PORT=1 METHOD=ZMODEM
```

To download the file `8-191.rez` from the downloads directory on the web server at www.company.com, when a name server has been set, use the command:

```
LOAD METHOD=HTTP DEST=FLASH FILE=/downloads/8-191.rez
    SERVER=www.company.com
```

To download the file `8-191.rez` from the downloads directory on the web server at www.company.com (with IP address `192.168.1.1`) when a name server is not defined, use the command:

```
LOAD METHOD=HTTP DEST=FLASH FILE=/downloads/8-191.rez
    SERVER=192.168.1.1
```

To download the file 8-191.rez from the downloads directory on the web server at www.company.com using a proxy server at 192.168.1.2 and the default proxy port, use the command:

```
LOAD METHOD=HTTP DEST=FLASH FILE=/downloads/8-191.rez
    HTTPPROXY=192.168.1.1 SERVER=www.company.com
```

See Also SET LOADER
SHOW LOADER
UPLOAD

LOGIN

Syntax

```
LOGIN [login-name]
```

where:

- *login-name* is a character string, 1 to 64 characters in length. Valid characters are uppercase letters (A–Z), lowercase letters (a–z), and decimal digits (0–9). The string may not contain spaces.

Description

This command is used to login to the router. The User Authentication Facility prompts the user for a login name (if not specified) and a password. The user must enter appropriate responses, pressing [Return] after each response. Characters entered at the password prompt are not echoed to the screen, for security reasons.

☞ *The password prompt is displayed regardless of whether or not a password is required for the login name entered by the user. This makes it more difficult for an intruder to discover valid login name/password combinations.*

If the user enters an invalid login name or password, the sequence is repeated a set number of times. If a valid login name and password has still not been entered the terminal or Telnet session is *locked out* for a period of time. During this period the password prompt is withheld, preventing the user from logging in or entering commands. The manager can specify the number of login attempts allowed and the length of the lockout period using the SET USER command on page 1-93.

This command is not normally required. The user will automatically be prompted to enter a login name and password when attempting to access the router via Telnet or a terminal connected to an asynchronous port set to SECURE mode, or when attempting to access a dialup service via an asynchronous modem connected to an asynchronous port.

This command might be used to login from a terminal connected to an asynchronous port that is not in SECURE mode in order to use facilities that are only available to logged in users, or to login as another user in order to acquire different rights, such as MANAGER privilege.

This command may be abbreviated to LOGI. The command LOGON is an alias for LOGIN.

☞ *If a user Telnets to the router but does not attempt to login within one minute, the router automatically times out the session and terminates the Telnet connection.*

See Also

LOGOFF

LOGOFF

Syntax `LOGOFF`

Description This command is used to log out from the router. For a terminal attached to an asynchronous port, the port returns to its default prompting state, either the login prompt for a port in SECURE mode, or the command prompt. For a Telnet session the TCP connection is terminated. LOGOUT is an alias for the LOGOFF and both commands may be abbreviated to LO.

See Also LOGIN

MAIL

Syntax

```
MAIL TO=destination {FILE=filename|MESSAGE=message}
    [SUBJECT=subject] [ETRN=mail-domain]
```

where:

- *destination* is a character string, 3 to 131 characters in length. Valid characters are letters (a-z, A-Z), digits (0-9) and the underscore character ("_").
- *filename* is a filename of the form `[device]:filename.ext`. `device` is the name of a memory device in which the file was stored (e.g. FLASH or NVS). `ext` is any valid file type that contains text, such as `.CFG`, `.SCP` and `.TXT`. Valid characters are letters (a-z, A-Z), digits (0-9) and the underscore character ("_"). Wildcards are not allowed.
- *message* is a character string, 1 to 131 characters in length. Valid characters are letters (a-z, A-Z), digits (0-9), the space character and the underscore character ("_"). If *subject* contains spaces it must be enclosed in double quotes.
- *subject* is a character string, 1 to 131 characters in length. Valid characters are letters (a-z, A-Z), digits (0-9), the space character and the underscore character ("_"). If *subject* contains spaces it must be enclosed in double quotes.
- *mail-domain* is a character string, 3 to 63 characters in length. Valid characters are letters (a-z, A-Z), digits (0-9) and the underscore character ("_").

Description This command sends an email message or the contents of a file to the specified email address.

The TO parameter specifies the email address to which the email will be sent. This is normally in the form `user@company.net`. However, if only the IP address of the destination mail host is known, that can be used by enclosing it in square brackets, e.g. `user@[202.49.73.5]`.

The FILE parameter specifies the name of a file on the router to send in the body of the email. The file must be of type text, and exist on the system.

The MESSAGE parameter specifies a single line of text to send in the body of the email. The parameters MESSAGE and FILE are mutually exclusive.

The SUBJECT parameter specifies the subject line to appear in the email. This field is not required but should normally be present in an email.

The ETRN parameter sends an ETRN request (as defined in RFC 1985) to the remote mail server to forward any queued mail messages for the specified mail domain or host name. This can be used to assist mail servers that are connected to the Internet via dial-up rather than permanent connections. A trigger can be created to send an ETRN message to the email service provider each time the router connects to the Internet.

☞ *Some mail servers will reject email messages from hosts without reverse DNS entries.*

☞ *For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.*

Examples

To send an email message to user@testcom.com, use the command:

```
MAIL TO=user@testcom.com SUBJ="Test Message" MESS="Greetings
   from router 192.168.14.1"
```

To send an ETRN request to the mail server mserver1.isp.com to forward mail queued for users in the email domain “company.com”, use the command:

```
MAIL TO=postman@mserver1.isp.com ETRN=company.com
```

See Also

DELETE MAIL
SET MAIL
SHOW MAIL

MODIFY

Syntax

```
MODIFY ADDR=address SIZE={BYTE|LONG|WORD} VAL=value-list
   [SPACE={SD|SP|UD|UP|UR}]
```

where:

- *address* is the base address of the block of memory to modify.
- *value-list* is either a list of up to five numbers (in hexadecimal) separated by commas (e.g. VAL=12,4ac,0,14e,65), or a text string of up to twenty characters surrounded by double quotes (e.g. VAL=“string”).

Description

This command modifies (overwrites) the contents of the router’s memory. The values to be written to memory are specified by the VAL parameter and are written to contiguous memory locations starting at the memory address specified by the ADDR parameter. The SIZE parameter specifies whether the values are written as BYTEs, LONGWORDs or WORDs. ADDR, VAL and SIZE must be specified. The SPACE parameter is optional and can be used to select any of the valid CPU address spaces (Table 1-9 on page 1-61). If SPACE is not specified the value will default to SD.

It is possible to use this command to modify any memory or I/O devices. This may interrupt the operation of the router.

The MODIFY command is provided mainly as a diagnostic tool. It should not be needed for normal operation of the router.

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

Examples This example modifies the first two words of memory starting at memory location 0x00000000:

```
MOD ADDR=0 SIZE=WORD VAL=5,6AA4
```

See Also DUMP

PURGE USER

Syntax `PURGE USER`

Description This command deletes all users from the User Authentication Database. The MANAGER account remains but the password is set to the default password, “friend”. Global configuration parameters and counters are not affected. To clear these counters use the RESET USER command on page 1-78.

See Also ADD USER
DELETE USER
DISABLE USER
ENABLE USER
RESET USER
SET USER
SHOW USER

RENAME

Syntax `RENAME` *`src-filename dest-filename`*

where:

- *src-filename* and *dest-filename* are file identifiers of the form `[device:]name.ext`. Valid characters are the lowercase letters (a–z), digits (0–9) and the hyphen character (-).

Description This command renames the specified file. The source and destination files must be on the same device (`NVS` or `FLASH`). The source file name must identify an existing file, and the destination file name must not already be in use. If the source file is not a text file then the source and destination file extensions must be the same.

Caution must be taken when renaming files, such as patches, releases, licences and configurations, since they contain information which is vital to the intended operation of the router.

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

Examples To rename the file `boot.cfg` to `saveboot.cfg`, use the command:

```
RENAME BOOT.CFG SAVEBOOT.CFG
```

See Also DELETE FILE
SHOW FILE

RESET HTTP SERVER

Syntax

```
RESET HTTP SERVER
```

Description This command resets the HTTP server. The server is restarted, debugging is disabled and all counters are reset to zero (0).

Examples To reset the HTTP server, use the command:

```
RESET HTTP SERVER
```

See Also DISABLE HTTP DEBUG
DISABLE HTTP SERVER
ENABLE HTTP DEBUG
ENABLE HTTP SERVER
SET HTTP SERVER
SHOW HTTP CLIENT
SHOW HTTP DEBUG
SHOW HTTP SERVER
SHOW HTTP SESSION

RESET LOADER

Syntax

```
RESET LOADER
```

Description This command aborts the current file transfer being undertaken by the LOADER module. All resources used by the transfer are released and any file in the process of being created is deleted. The LOADER module becomes immediately ready for a new load to be initiated.

See Also LOAD
SET LOADER
SHOW LOADER

RESET USER

Syntax

```
RESET USER[=login-name] [COUNTER[={ALL|GLOBAL|USER}]]
```

where:

- *login-name* is a character string, 1 to 64 characters in length. Valid characters are uppercase letters (A–Z), lowercase letters (a–z), and decimal digits (0–9). The string may not contain spaces.

Description

This command is used to reset User Authentication Database counters for one or all users, or to reset global counters for the User Authentication Facility.

If a login name is specified with the USER parameter, the COUNTER parameter is optional (only USER may be specified) and the activity counters for the specified user are reset. The login name is not case sensitive.

If a login name is not specified with the USER parameter then the COUNTER parameter is required and specifies which counters should be reset. If USER is specified, the activity counters for all users are reset. If GLOBAL is specified, the global counters for the User Authentication Facility are reset. If ALL is specified, all counters are reset.

Examples

To reset the activity counters for user BRUCE, use the command:

```
RESET USER=BRUCE
```

To reset the activity counters for all users, use the command:

```
RESET USER COUNTER=USER
```

To reset the global counters, use the command:

```
RESET USER COUNTER=GLOBAL
```

See Also

ADD USER
DELETE USER
DISABLE USER
ENABLE USER
PURGE USER
SET USER
SHOW USER

RESTART

Syntax

```
RESTART {REBOOT|ROUTER} [CONFIG0={filename|NONE}]
```

where:

- *filename* is a file name of the form `device:filename.ext`. Valid characters are the lowercase letters (a–z), digits (0–9) and the hyphen character (-). Wildcards are not allowed.

Description

This command restarts the router with either the current configuration file (set with the SET CONFIG command on page 1-80) or the specified configuration file.

If REBOOT is specified the router performs a cold start (hardware reset) and executes the default configuration file, if one is defined. The CONFIG parameter may not be specified.

If ROUTER is specified the router performs a warm start of all software modules (the hardware is not reset) and executes the default configuration file, if one is defined. The CONFIG parameter may be used to specify a script or configuration file other than the current default. The file extension must be “`scp`” or “`cfg`”. If NONE is specified, the router will reboot without executing any configuration file.

If the router is operating in security mode and a configuration script is specified, the configuration script must create a user with SECURITY OFFICER privilege, so that when the router restarts in security mode there is at least one user with sufficient privilege to execute critical commands. The router will display a warning message to this effect and prompt for a confirmation.

Examples

To restart the router using the configuration file test.cfg instead of the default configuration file, use the command:

```
RESTART ROUTER CONFIG=TEST.CFG
```

See Also

SHOW CONFIG
SHOW EXCEPTION
SHOW STARTUP

SET CONFIG

Syntax

```
SET CONFIG=filename
```

where:

- *filename* is a file name of the form `device:filename.ext`. Valid characters are the lowercase letters (a–z), digits (0–9) and the hyphen character (-). Wildcards are not allowed.

Description

This command sets the script file which the router will use as its default configuration. The file name is stored in either an NVS block if the router is fitted with NVS, or in a FLASH File System file.

The CONFIG parameter specifies the name of the script or configuration file to use. The file extension must be "`scp`" or "`cfg`". The file must already exist on the router. The commands in the script file are executed when the router is rebooted or performs a warm restarted.

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege. If the router is operating in security mode, the configuration script must create a user with SECURITY OFFICER privilege, so that when the router restarts in security mode there is at least one user with sufficient privilege to execute critical commands. The router will display a warning message to this effect and prompt for a confirmation.

Examples

To set the default configuration file to boot.cfg, use the command:

```
SET CONFIG=BOOT.CFG
```

See Also

RESTART
CREATE CONFIG
SHOW CONFIG

SET HELP

Syntax

```
SET HELP=helpfile
```

where:

- *helpfile* is a file name of the form `device:filename.ext`. Valid characters are the lowercase letters (a–z), digits (0–9) and the hyphen character (-). Wildcards are not allowed.

Description

This command sets the system help file used by the HELP command on page 1-69. The HELP parameter specifies the name of the text file containing the help text for the router. If the device field is not specified, the default is `FLASH`.

Examples

To set the help file to the file E72-01.HLP, use the command:

```
SET HELP=E72-01.HLP
```

See Also

HELP
SHOW SYSTEM

SET HTTP SERVER

Syntax

```
SET HTTP SERVER HOMEPAGE=filename
```

where:

- *filename* is a filename 1 to 8 characters in length, followed by an extension of `.HTM`. Valid characters are lowercase letters (a–z), uppercase letters (A–Z), digits (0–9) and the hyphen character (-). The router does not distinguish upper- and lowercase letters.

Description

This command sets the home page for the router's HTTP server. The filename must be the name of a file stored in the router's FLASH memory. The HOMEPAGE parameter specifies the page the HTTP server returns when it receives a request that does not specify a particular page, and when no web-based GUI is installed on the router. If there is a web-based GUI, the router will return the GUI home page when a request does not specify a page, ignoring the HOMEPAGE parameter set with this command. The default is homepage.htm.

Example

To set the router's HTTP server homepage to the file index.htm stored in the router's FLASH memory, use the command:

```
SET HTTP SERVER HOMEPAGE=index.htm
```

See Also

DISABLE HTTP DEBUG
DISABLE HTTP SERVER
ENABLE HTTP DEBUG
ENABLE HTTP SERVER
RESET HTTP SERVER
SHOW HTTP CLIENT
SHOW HTTP DEBUG
SHOW HTTP SERVER
SHOW HTTP SESSION

SET INSTALL

Syntax

```
SET INSTALL={TEMPORARY|PREFERRED|DEFAULT}
    [RELEASE={release-name|EPROM}] [PATCH[=patch-name]]
```

where:

- *release-name* is the name of a release file, of the form `device:filename.ext`. Valid characters are the lowercase letters (a–z), digits (0–9) and the hyphen character (-). Wildcards are not allowed.
- *patch-name* is the name of the patch file to set in this install.

Description

This command sets up release and patch information for one of the installs.

The INSTALL parameter specifies which install is to be set. The INSTALL module is responsible for maintaining install information and loading the correct install at boot. An *install* is a record identifying a release and an optional patch. Three installs are maintained by the INSTALL module, *temporary*, *preferred* and *default*.

The default install is the install of last resort. The release for the default install can not be changed by the manager and is always the EPROM release. The patch for the default install may be set by the manager.

The temporary and preferred installs are completely configurable. Both the release and an associated patch may be set. The release may be EPROM or a release stored in FFS.

The RELEASE parameter specifies the release file for this install. The release file is either a file name of the form `device:filename.ext` for files in the file subsystem, or EPROM, to indicate the EPROM release. The default value for the device field is FLASH.

The PATCH parameter specifies the patch file for this install, and is a file name of the form `device:filename.ext`. The patch file may be resident in either NVS or FLASH. The default value for the device field is `FLASH`. If the patch name is not given, the patch file information for a given install is removed and only the release file will be loaded for the install.

A patch file can not be set up for an install unless a release file is already set up, or a release file is specified in the same command. This stops the inadvertent setting of an install to be just a patch file. When the router reboots in such a case the particular install is ignored, which may have undesirable effects on the router operation.

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

Examples

To set up the release file 28-761.rel and patch file 28761-01.pat in FLASH as a temporary install, use the command:

```
SET INSTALL=TEMPORARY RELEASE=28-761.REL PATCH=28761-01.PAT
```

See Also

DELETE INSTALL
SHOW INSTALL

SET LOADER

Syntax

```
SET LOADER [DELAY={delay|DEFAULT}] [DESTINATION={FLASH|
   NVS|DEFAULT}] [FILE=filename] [HTTPPROXY={hostname|
   ipadd|DEFAULT}] [METHOD={HTTP|TFTP|WEB|WWW|ZMODEM|NONE|
   DEFAULT}] [PORT={port|DEFAULT}] [PROXYPORT={1..65535|
   DEFAULT}] [SERVER={hostname|ipadd|DEFAULT}]
```

where:

- *delay* is a time delay, in seconds.
- *filename* is a character string, 1 to 100 characters in length. This is a full path name for the file to load in the syntax of the server from which the file will be loaded.
- *ipadd* is an IP address in dotted decimal notation.
- *hostname* is a character string, 1 to 40 characters in length.
- *port* is the number of an asynchronous port. Ports are numbered sequentially from port 0.

Description

This command sets default values for the LOAD command on page 1-70. All values that can be specified with the LOAD command can also be specified as defaults with the SET LOADER command. All these parameters except FILE can also be set back to the factory defaults with the option DEFAULT. Any parameters not specified in the LOAD command will use the default value.

The DELAY parameter specifies the delay, in seconds, between initiating the file download and the download actually starting. This feature is provided to allow reconfiguration of ports and devices after initiating the download. For example, a manager may be at a remote site with a single PC which is to act as both the access device to the router and the TFTP server. By specifying a delay, the manager has time to reconfigure the PC from terminal emulation mode to TFTP server mode before the download starts. The DELAY parameter is optional. If DEFAULT is specified, this parameter is set to the factory default, which is no delay.

The DESTINATION parameter specifies where the file will be stored. If NVS is specified, the file is stored in the battery backed non-volatile storage on the router. Only patch files and script files can be stored in NVS due to the size limitations of NVS. If FLASH is specified, the file is stored in the FLASH File System (FFS) on the router. Patch files, release files and script files may be stored in FLASH. If DEFAULT is specified, this parameter is set to the factory default, FLASH.

The FILE parameter specifies the name of the file, in the syntax of the server from which the file will be downloaded. The FILE parameter is a full path name rather than just a file name. The only restriction is that the last part of the parameter must be a valid file name for the LOADER module. When METHOD is set to TFTP, HTTP, ZMODEM or NONE, valid file names are of the form `filename.ext` where `filename` is one to eight characters in length and `ext` is three characters in length. The following are examples of valid file names for methods TFTP, ZMODEM or NONE:

```
\user\public\filename.ext ; UNIX or DOS server
[network.cfg]filename.ext ; DEC VAX server
```

Note that, starting at the end of the file name and working backwards, the first character not valid in file names delimits a valid file name for the router. If the slash at the beginning of the path is omitted in this command, the LOAD command adds it. The following are examples of valid file names for method HTTP:

```
/path/filename.ext
```

```
path/filename.ext
```

The HTTPPROXY parameter specifies the proxy server used to handle HTTP requests. Either the IP address or the fully qualified domain name of the proxy server may be specified. If a domain name is specified, the router will perform a DNS lookup to resolve the name. If DEFAULT is specified, this parameter is set to the factory default, which has no value set for HTTPPROXY, clearing any value previously set as default.

The METHOD parameter specifies the method to use when downloading the file. If HTTP is specified, HTTP is used to download the file. The options WEB and WWW are synonyms for HTTP. If TFTP is specified, TFTP is used to download the file. If ZMODEM is specified, the ZMODEM protocol is used to download the file. If ZMODEM is specified, the PORT parameter must be specified, unless it has been set with the SET LOADER command on page 1-83. If NONE is specified, only text files can be downloaded and all input received via the port will be directed to the specified file on the router’s file subsystem. The file transfer is terminated by the first control character received that is not a CR or LF character. The FILE parameter is not valid when METHOD is set to ZMODEM. The PORT parameter is not valid when METHOD is set to HTTP, WEB, WWW, TFTP or NONE. If DEFAULT is specified, this parameter is set to the factory default, which is TFTP.

The PORT parameter specifies the asynchronous port via which the file will be downloaded, when the METHOD parameter is set to ZMODEM or NONE. If METHOD is set to ZMODEM or NONE, the PORT parameter is required unless it has been set with the SET LOADER command on page 1-83. If DEFAULT is specified, this parameter is set to the factory default, which is no PORT set, clearing any value previously set as default.

The PROXYPORT parameter specifies the port on a proxy server. The PROXYPORT parameter is only valid if METHOD is HTTP and HTTPPROXY is specified. If DEFAULT is specified, this parameter is set to the factory default, which is 80.

The SERVER parameter specifies the IP address or the host name (a fully qualified domain name) of the TFTP server or HTTP server from which the file is loaded. If a host name is specified, a DNS lookup is used to translate this to an IP address. See SET IP NAMESERVER command on page 8-118 of *Chapter 8, Internet Protocol (IP)* for more information about setting up name servers. The PING command on page 8-103 of *Chapter 8, Internet Protocol (IP)* can be used to verify that the router can communicate with the server via IP. The SERVER parameter is not used when METHOD is set to ZMODEM or NONE. The following are examples of valid server names when METHOD is set to HTTP:

```
host.company.com
```

```
192.168.3.4
```

If DEFAULT is specified, this parameter is set to the factory default, which has no value set for SERVER, clearing any value previously set as default.

Examples To set the default download parameters to be release `28-72.rel` downloaded into the FLASH File System from the TFTP server with IP address 172.16.8.5, with a delay of one minute, use the command:

```
SET LOAD FILE=28-72.REL DESTINATION=FLASH SERVER=172.16.8.5
   DELAY=60
```

To clear all defaults previously set with the SET LOADER command (except the filename), and restore defaults to the loader module, use the command:

```
SET LOADER DELAY=DEFAULT DESTINATION=DEFAULT
   HTTPPROXY=DEFAULT METHOD=DEFAULT PORT=DEFAULT
   PROXYPORT=DEFAULT SERVER=DEFAULT
```

See Also LOAD
SHOW LOADER

SET MAIL

Syntax SET MAIL HOSTNAME=*hostname*

where:

- *hostname* is a character string, 1 to 63 characters in length. Valid characters are any character except spaces (“ “), control characters (ASCII 0–31 and 127) and the special characters “()<>@,;:\".[]”.

Description This command sets the host name used by the mail system when it communicates with other mail systems.

The HOSTNAME parameter specifies the host name used by the mail system when it communicates with other mail systems. The host name is normally the fully specified domain name of the router, e.g. `router1.myorg.com`. The host name will appear in the *From* field of the message header when the message is received by the remote mail system.

☞ *The mail system is not enabled until the host name has been specified*

Examples To set the mail host name to router1.myorg.com, use the command:

```
SET MAIL HOSTNAME=router1.myorg.com
```

See Also SHOW MAIL

SET MANAGER PORT

Syntax

```
SET MANAGER PORT={port-number|NONE}
```

where:

- *port-number* is the number of the port. Ports are numbered sequentially starting with port 0.

Description

This command sets the semipermanent manager port. If a valid port number is specified the port becomes the semipermanent manager port. If the specified port was secure before the command was entered it loses its secure setting. If any other port is currently the semipermanent manager port then that port loses its semipermanent MANAGER privilege and becomes a secure port. If NONE is specified the current semipermanent manager port (if any) loses its semipermanent MANAGER privilege and becomes a secure port. There may be no more than one semipermanent manager port at any time.

This command is one of the security commands (see "Database Security" on page 1-15). If the security timer expires before the command is entered, the manager will be prompted to re-enter the password for the login name from which the command was issued.

Examples

To set port 0 as the semipermanent manager port, use the command:

```
SET MANAGER PORT=0
```

To remove the semipermanent manager port, use the command:

```
SET MANAGER PORT=NONE
```

See Also

LOGIN
SHOW MANAGER PORT
SET PORT in *Chapter 2, Interfaces*

SET NVS CLEAR_TOTALLY

Syntax

```
SET NVS CLEAR_TOTALLY
```

Description

This command resets the nonvolatile storage (NVS) and deletes all the NVS blocks.

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

See Also

SET NVS CREATE
SET NVS DELETE
SET NVS MODIFY
SHOW NVS

SET NVS CREATE

Syntax

```
SET NVS CREATE BLOCK=id INDEX=index LENGTH=length
    CREATOR=creator
```

where:

- *id* is the block ID in hexadecimal of the block to create.
- *index* is the index in hexadecimal of the block.
- *length* is the size (in bytes) in hexadecimal of the block.
- *creator* is the creator ID in hexadecimal of the block.

Description

This command creates a new nonvolatile storage (NVS) block identified by BLOCK and INDEX. If a block already exists with the specified *id*/*index*, an error is returned. The contents of the block is undefined.

The SET NVS CREATE command on page 1-87 should not normally be required since all software modules create the NVS blocks they require during initialisation or operation. This command is intended mainly for debugging purposes.

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

Examples

To create an NVS block with a block id, index and creator id of 99, and a length of 512 bytes, use the command:

```
SET NVS CREATE BLOCK=99 INDEX=99 CREATOR=99 LENGTH=200
```

See Also

SET NVS CLEAR_TOTALLY
SET NVS DELETE
SET NVS MODIFY
SHOW NVS

SET NVS DELETE

Syntax

```
SET NVS DELETE BLOCK=id INDEX=index
```

where:

- *id* is the block identifier in hexadecimal.
- *index* is the block index in hexadecimal.

Description

This command will delete a block from the nonvolatile storage (NVS). The block must be identified by BLOCK and INDEX. The keyword DELETE may not be abbreviated.

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

Examples To delete the NVS block with a block id and index of 99, use the command:

```
SET NVS DELETE BLOCK=99 INDEX=99
```

See Also SET NVS CLEAR_TOTALLY
SET NVS CREATE
SET NVS MODIFY
SHOW NVS

SET NVS MODIFY

Syntax

```
SET NVS MODIFY BLOCK=id INDEX=index OFFSET=offset
    SIZE={BYTE|LONG|WORD} VALUES=value-list
```

where:

- *id* is the block identifier in hexadecimal.
- *index* is the block index in hexadecimal.
- *offset* is the offset in hexadecimal within the block where the values should be written.
- *value-list* is a list of values, in hexadecimal, separated by commas.

Description This command allows the contents of a nonvolatile storage (NVS) block to be modified. The block must be identified by BLOCK and INDEX.

The command will write the data values, padded to length SIZE, contiguously into the block starting at the specified OFFSET. None of the data values may require more space than the specified SIZE.

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

Examples To set the third byte of the NVS block with a block id and index of 99, to the value 254, use the command:

```
SET NVS MODIFY BLOCK=99 INDEX=99 OFFSET=3 SIZE=BYTE VALUES=FE
```

See Also SET NVS CLEAR_TOTALLY
SET NVS CREATE
SET NVS DELETE
SHOW NVS
SHOW NVS DUMP

SET PASSWORD

Syntax

```
SET PASSWORD
```

Description

This command changes the login password for the user currently logged in to the port from which the command was entered. If a user is not logged in to the port an error message is displayed. If a user is logged in to the port, the user is prompted for the existing password, the new password and confirmation of the new password. The passwords entered are not echoed to the screen.

The new password and the confirmation must be identical for the change to take affect. This reduces the chances of a typing error causing the password to be different from what the user intended.

A log message is generated whenever the password for an account with MANAGER privilege is changed. A configurable minimum password length is enforced. The default is 6 characters.

Examples

To change the password for the current user, use the command:

```
SET PASSWORD
Old password:
New password:
Confirm:
```

See Also

ADD USER
SET USER

SET SYSTEM CONTACT

Syntax

```
SET SYSTEM CONTACT=contact-name
```

where:

- *contact-name* is a character string, 1 to 256 characters in length. Valid characters are any printable character. If the string includes spaces it must be enclosed in double quotes.

Description

This command assigns a string defining the contact name for this router. For example “Bruce Johns, 64-3-343-0803”. The string can be a maximum of 80 characters. The text is displayed in the output of the SHOW SYSTEM command on page 1-124. It also updates the MIB object *sysContact* which can then be read using SNMP.

Examples

To set the contact name for this router to “Bruce Johns, 64-3-343-0803”, use the command:

```
SET SYSTEM CONTACT=“Bruce Johns, 64-3-343-0803”
```

See Also

SET SYSTEM LOCATION
SET SYSTEM NAME
SET SYSTEM TERRITORY
SHOW SYSTEM

SET SYSTEM LOCATION

Syntax

```
SET SYSTEM LOCATION=location
```

where:

- *location* is a character string, 1 to 256 characters in length. Valid characters are any printable character. If the string includes spaces it must be enclosed in double quotes.

Description

This command assigns a string defining the physical location of this router. For example “Laboratory, First Floor, Head Office Building”. The string can be a maximum of 80 characters. The text is displayed in the output of the SHOW SYSTEM command on page 1-124. It also updates the MIB object *sysLocation* which can then be read using SNMP.

Examples

To set the location for this router to “Laboratory, First Floor, Head Office Building”, use the command:

```
SET SYSTEM LOCATION=“Laboratory, First Floor, Head Office
    Building”
```

See Also

SET SYSTEM CONTACT
SET SYSTEM NAME
SET SYSTEM TERRITORY
SHOW SYSTEM

SET SYSTEM NAME

Syntax

```
SET SYSTEM NAME=name
```

where:

- *name* is a character string, 1 to 256 characters in length. Valid characters are any printable character. If the string includes spaces it must be enclosed in double quotes.

Description

This command assigns a string defining the name of this router. By convention this is the full domain name of the IP entity. For example, `nd1.co.nz`. The name can be a maximum of 80 characters. The text is displayed in the output of the SHOW SYSTEM command on page 1-124. It also updates the MIB object *sysName* which can then be read using SNMP.

Examples

To set the name for this router to “nd1.co.nz”, use the command:

```
SET SYSTEM NAME=“nd1.co.nz”
```

See Also

SET SYSTEM CONTACT
SET SYSTEM LOCATION
SET SYSTEM TERRITORY
SHOW SYSTEM

SET SYSTEM RPSMONITOR

Syntax

```
SET SYSTEM RPSMONITOR={ON|OFF}
```

Description

This command turns monitoring of the redundant power supply (RPS) on or off (on models that support RPS monitoring only). When RPS monitoring is on, the state of the RPS connection, power supply and fan can be displayed with the SHOW SYSTEM command on page 1-124, and any failures will be indicated by flashing LED patterns (Table 1-11). By default, RPS monitoring is off.

Table 1-11: LED indications for fan an power supply faults on the ATAR740 router.

When this fault occurs...	The System LED flashes in this pattern...
RPS fan failure	0.2s on, 0.3s off, 0.2s on, 2s pause, (repeat)...
RPS PSU failure	0.2s on, 0.3s off, 0.2s on, 0.3s off, 0.2s on, 0.3s off, 0.2s on, 2s pause, (repeat)...
RPS not connected	0.2s on, 0.3s off, 0.2s on, 0.3s off, 0.2s on, 0.3s off, 0.2s on, 0.3s off, 0.2s on, 2s pause, (repeat)...

Examples

To turn on monitoring of the router’s RPS, use the command:

```
SET SYSTEM RPSMONITOR=ON
```

See Also

SHOW SYSTEM

SET SYSTEM TERRITORY

Syntax

```
SET SYSTEM TERRITORY={AUSTRALIA|CHINA|EUROPE|JAPAN|KOREA|
   NEWZEALAND|USA}
```

Description

This command assigns a territory identifier for the router. The territory identifier is used by the Q.931, PRI and PBX modules to set defaults that are appropriate for the territory in which the router is being operated. The default territory is EUROPE.

☞ *If the router territory identifier is changed, parameters in the Q.931, PRI and PBX modules that are influenced by the territory in which the router is being operated will automatically be changed to values appropriate for the new territory setting. If the current territory value is specified, i.e. the territory is unchanged, then the module parameters are restored to the default values for that territory.*

Examples

To set the name for this router to Australia, use the command:

```
SET SYSTEM TERRITORY=AUSTRALIA
```

See Also SET SYSTEM CONTACT
SET PBX in *Chapter 25, Telephony Services*
SET PRI in *Chapter 5, Integrated Services Digital Network (ISDN)*
SET Q931 in *Chapter 5, Integrated Services Digital Network (ISDN)*
SET SYSTEM LOCATION
SET SYSTEM NAME
SHOW PBX in *Chapter 25, Telephony Services*
SHOW PRI CONFIGURATION in *Chapter 5, Integrated Services Digital Network (ISDN)*
SHOW PRI STATE in *Chapter 5, Integrated Services Digital Network (ISDN)*
SHOW Q931 in *Chapter 5, Integrated Services Digital Network (ISDN)*
SHOW SYSTEM

SET TIME

Syntax `SET [TIME=`*`time`*`] [DATE=`*`date`*`]`

where:

- *time* is the time in 24 hour format `(hh:mm:ss).`
- *date* is the date in the format `dd-mmm-yy` where the month is given as the first three letters of the month name (e.g. APR).

Description This command sets the time and/or date stored in the router's real-time clock.

Examples The following commands set the router's real-time clock to 10pm on 29 January 1993:

```
SET TIME=22:00:00
SET DATE=29-JAN-93
```

See Also SHOW TIME

SET USER

Syntax

```
SET USER=login-name [CALLINGNUMBER=number]
    [CBNUMBER=e164number] [DESCRIPTION=description]
    [PASSWORD=password] [PRIVILEGE={USER|MANAGER|
    SECURITYOFFICER}] [TELNET={YES|NO}] [IPADDRESS=ipadd]
    [IPXNETWORK=network] [NETMASK=ipadd] [MTU=40..1500]

SET USER [LOGINFAIL=1..10] [LOCKOUTPD=0..30000]
    [MANPWDFAIL=1..5] [SECUREDELAY=10..600]
    [MINPWDLEN=1..23] [TACRETRIES=0..10] [TACTIMEOUT=1..60]
```

where:

- *login-name* is a character string, 1 to 64 characters in length. Valid characters are uppercase letters (A–Z), lowercase letters (a–z), and decimal digits (0–9). The string may not contain spaces.
- *password* is a character string, 1 to 32 characters in length. Valid characters are any printable character. If the string contains spaces it must be enclosed in double quotes.
- *number* is an ISDN phone number, 1 to 32 characters in length. Valid characters are any printable characters. If the string contains spaces it must be enclosed in double quotes.
- *e164number* is the phone number to dial when performing callback. It may contain digits (0–9) and should be a valid phone number as described in CCITT standard E.164.
- *description* is a character string, 1 to 23 characters in length. Valid characters are any printable character. If the string contains spaces it must be enclosed in double quotes.
- *ipadd* is an IP address in dotted decimal notation.
- *network* is a valid Novell network number, expressed as a hexadecimal number. Leading zeros may be omitted.

Description

This command modifies a user record in the User Authentication Database or alters global parameters affecting the User Authentication Facility.

The first variant of the command is used to alter a user record in the User Authentication Database. The USER parameter specifies the login name of a user in the database. Other parameters specified on the command modify the information stored in the database for that user. The second variant of the command is used to alter the global security parameters for the User Authentication Facility.

The CALLINGNUMBER parameter specifies the calling number to be used to authenticate incoming calls from L2TP and ISDN services that provide caller ID information. While any printable characters will be accepted for this parameter, the calling number it is to match is likely to contain only decimal digits. Any other characters used in this parameter are unlikely to match the calling number of an incoming call.

The CBNUMBER parameter specifies the ISDN phone number to use when making a call back to a remote user using the PPP callback facility.

The DESCRIPTION parameter specifies a descriptive text for the entry, such as the full name and location of the user. This string may contain any printing character and the case is preserved in output.

The PASSWORD parameter specifies the password for the user. The password is case sensitive. It is intended that the PASSWORD parameter be used to set an initial password for the user and that the user will change it to some string known only to the user, using the command:

```
SET PASSWORD
```

A password set with the SET PASSWORD command on page 1-89 may contain any printing character. A configurable minimum password length is enforced. The default is 6 characters.

The PRIVILEGE parameter specifies the privilege level for the user. The default is USER. A user with USER privilege has access to only a limited subset of commands, generally commands that only affect the user’s own session or asynchronous port. A user with MANAGER privilege has access to the complete router command set when the router is operating in normal mode, or a subset of commands when the router is operating in security mode. A user with SECURITY OFFICER privilege has access to the full set of commands, and in particular, can access security commands while the router is operating in security mode.

The TELNET parameter specifies whether or not the user is permitted to use the TELNET command on page 11-24 of *Chapter 11, Terminal Server* to Telnet to another host, or the CONNECT command on page 11-13 of *Chapter 11, Terminal Server* to access a Telnet service when logged in via Telnet.

The IPADDRESS parameter specifies an IP address for the user. The value must be a valid IP address in dotted decimal form.

The IPXNETWORK parameter specifies the Novell network number assigned to the user accessing a Novell internetwork. See *Chapter 18, Asynchronous Call Control* for more information. The network number may be cleared by setting IPXNETWORK to NONE instead of a network number. The default is NONE.

The NETMASK parameter specifies an IP network mask for the user. The value must be a valid IP address in dotted decimal form.

The MTU parameter specifies a Maximum Transmission Unit value for the user. The value must be a decimal integer in the range 40 to 1500 inclusive.

The IPADDRESS, NETMASK and MTU parameters are only required if the user is to login in order to make a PPP or SLIP connection to the router over a modem connected to an asynchronous port.

The LOGINFAIL parameter sets the number of successive login failures a user may make before the login prompt is withheld for the lockout period. The default value is 3.

The LOCKOUTPD parameter sets the number of seconds that the login prompt will be withheld when the number of login retries exceeds the value set by LOGINFAIL. The default is 600 seconds.

The MANPWDFAIL parameter sets the number of successive attempts a manager may make to enter the correct password while entering a security command before the session is automatically logged off. The default value is 3.

The SECUREDELAY parameter sets the number of seconds that may elapse between the entry of one security command and the next without the user being required to re-enter the SECURITY OFFICER password to validate the command. The default is 60 seconds.

The MINPWDLEN parameter sets the minimum password length that will be enforced for the ADD USER commands and SET PASSWORD commands. The default is 6 characters.

The TACRETRIES parameters sets the number of times a TACACS request will be resent when a response is not received within the timeout period. The default value is 3.

The TACTIMEOUT parameter sets the number of seconds the router will wait for a TACACS response before retransmitting the request, or giving up if the number of retries permitted has been reached. The default value is 5 seconds.

Examples

To change the password to "BZ4gal" and the privilege level to MANAGER for user BRUCE, use the command:

```
SET USER=BRUCE PASSWORD=BZ4gal PRIVILEGE=MANAGER
```

To change the minimum password length to eight characters for all users, use the command:

```
SET USER MINPWDLEN=8
```

See Also

ADD USER
DELETE USER
DISABLE SYSTEM SECURITY_MODE
DISABLE USER
ENABLE SYSTEM SECURITY_MODE
ENABLE USER
PURGE USER
RESET USER
SHOW USER

SHOW ALIAS

Syntax

```
SHOW ALIAS
```

Description

This command displays the aliases currently defined on the router (Table 1-8 on page 1-95, Table 1-12 on page 1-96).

Figure 1-8: Example output from the SHOW ALIAS command.

```
Alias ....... df
  String .... delete file=1-190.rez

Alias ....... ii
  String .... ip interface
```

Table 1-12: Parameters displayed in the output of the SHOW ALIAS command.

Parameter	Meaning
Alias	The name of the alias.
String	The string substituted for the alias when it appears in a command line.

See Also ADD ALIAS
DELETE ALIAS

SHOW BUFFER

Syntax `SHOW BUFFER [SCAN[=address [QUEUEPOINTERS]]]`

where:

- *address* is the memory address of a section of router code, expressed in hexadecimal.

Description This command displays information about the memory buffers in use by router modules. If no optional parameters are specified, a summary of the buffers in use is displayed (Figure 1-9 on page 1-96, Table 1-13 on page 1-97).

The SCAN parameter displays more detailed information about buffers usage. If an address is not specified, the memory addresses of sections of router code and the number of buffers in used by that section are displayed (Figure 1-10 on page 1-97). If an address is specified, the addresses of the buffers in use by that section of router code are displayed (Figure 1-11 on page 1-98). The value for *address* is obtained from the output of a previous SHOW BUFFER SCAN command.

The QUEUEPOINTERS parameter displays additional information about the contents of the buffers used by the router code section at the specified address (Figure 1-12 on page 1-98), and is only valid when the SCAN parameter is specified with a valid address.

The SCAN and QUEUEPOINTERS parameters display low-level debugging information. Use these parameters only when directed to by technical support personnel.

Figure 1-9: Example output from the SHOW BUFFER command.

```
Memory ( DRAM ) .......... 1638 kB
Free Memory .............. 48 %
Free fast buffers ........ 1799
Total fast buffers ....... 1802
Free buffers ............. 4013
Total buffers ............ 4096
Buffer level 3 ........... 125  (don't process input frames)
Buffer level 2 ........... 250  (don't do monitor or command output)
Buffer level 1 ........... 500  (don't buffer up log messages)
```

Table 1-13: Parameters displayed in the output of the SHOW BUFFER command.

Parameter	Meaning
Memory (DRAM)	The total amount of DRAM installed in the router.
Free memory	The amount of free (unused) memory, as a percentage of total available memory.
Free fast buffers	[Power PC based routers and switches only] The number of free (unused) fast memory buffers. Fast buffer memory is cached by the CPU and is available only for program variable storage. It cannot be used for packet buffers.
Total fast buffers	[Power PC based routers and switches only] The total number of fast memory buffers.
Free buffers	The number of free (unused) memory buffers.
Total buffers	The total number of memory buffers.
Buffer level n	Levels at which certain processes are halted if the value of "Free buffers" drops below that level.

Figure 1-10: Example output from the SHOW BUFFER SCAN command.

```
Scan of buffers in use

00093d62    2  001338a2    1  0013d27c    1  000cd26a    1  000ccfc2    7
000cd326    5  000cd542    1  0006d1f0    1  000a03e4    1  000a4256    1
001f544e    1  001f5484    1  001f54c0    1  000a50da    1  00082e52    1
0013fe40    2  0008c8b0    1  0008c8f0    1  0008c92c    1  0008f7f6    1
000ebd32    1  000ec0a2    2  000ec364    3  00080048    8  00081352    1
0016ef96    1  0012fd76    1  0012f64a    1  00086e3c    1  0008871a    1
000b6866    1  001f5338   10  001526e0    1  0011e892    2  00099486    1
001194d4    1  0011deb0   17  0011fd6a    2  0011d278    1  001139a4    1
0011b354    1  0011d7e8    1  001fe0ca    1  001fb446    1  001fb48c    2
001fb4e8    2  001fb52a    1  0005e95c    1  0005e9f8    1  000d3976    1
00161596    1  00153b60    1  000994ae    1  000d133e    1  000bbc3a    1
00163154    1  001069fc    1  000a4916    1  000a5298    1  00141e26    1
00157156    1  000f4028    1  00169bd8    1  000a9654    1  001352a4   16
000892ae    1  001524fa    1  00087014    1  00089666    1  0008625c    1
0012f6d2    1  00141e30    1  00141e3a    1  0014190e    1  00141940    1
000c512a   15  00087624    1

Total buffers in use - 84


Scan of fast buffers in use

002e3644    1 002f2170     2

Total fast buffers in use -3


  Memory ( DRAM ) .......... 16384 kB
  Free Memory .............. 48 %
  Free fast buffers ........ 1799
  Total fast buffers ....... 1802
  Free buffers ............. 4013
  Total buffers ............ 4096
  Buffer level 3 ........... 125  (don't process input frames)
  Buffer level 2 ........... 250  (don't do monitor or command output)
  Buffer level 1 ........... 500  (don't buffer up log messages)
```

Figure 1-11: Example output from the SHOW BUFFER SCAN command for a specified address.

```
002c93bc  002ce7bc  002d42bc  002d49bc  002d57bc  002d5ebc
002d65bc  002df8bc  002dffbc  002e0dbc  002e14bc  002eaebc
002eb5bc  002ec3bc  002ecabc


  Memory ( DRAM ) .......... 16384 kB
  Free Memory .............. 48 %
  Free fast buffers ........ 1799
  Total fast buffers ....... 1802
  Free buffers ............. 4013
  Total buffers ............ 4096
  Buffer level 3 ........... 125  (don't process input frames)
  Buffer level 2 ........... 250  (don't do monitor or command output)
  Buffer level 1 ........... 500  (don't buffer up log messages)
```

Figure 1-12: Example output from the SHOW BUFFER SCAN QUEUEPOINTERS command.

```
002c93bc  002df8bc  002d5ebc  002c9434   002ce7bc  002e0dbc  002dffbc  002ce834
002d42bc  002d49bc  002569f0  002d4334   002d49bc  002d57bc  002d42bc  002d4a34
002d57bc  002d5ebc  002d49bc  002d5834   002d5ebc  002c93bc  002d57bc  002d5f34
002d65bc  002ec3bc  002eb5bc  002d6634   002df8bc  002dffbc  002c93bc  002df934
002dffbc  002ce7bc  002df8bc  002e0034   002e0dbc  002e14bc  002ce7bc  002e0e34
002e14bc  002eaebc  002e0dbc  002e1534   002eaebc  002eb5bc  002e14bc  002eaf34
002eb5bc  002d65bc  002eaebc  002eb634   002ec3bc  002ecabc  002d65bc  002ec434
002ecabc  002569f0  002ec3bc  002ecb34


  Memory ( DRAM ) .......... 16384 kB
  Free Memory .............. 48 %
  Free fast buffers ........ 1799
  Total fast buffers ....... 1802
  Free buffers ............. 4013
  Total buffers ............ 4096
  Buffer level 3 ........... 125  (don't process input frames)
  Buffer level 2 ........... 250  (don't do monitor or command output)
  Buffer level 1 ........... 500  (don't buffer up log messages)
```

SHOW CONFIG

Syntax `SHOW CONFIG [DYNAMIC[=`*`module-id`*`]]`

where:

- *module-id* is the name of a router module (see "*Module Identifiers and Names*" on page C-2 of *Appendix C, Reference Tables* for a complete list).

Description This command displays the current configuration file for the router, or the current dynamic configuration for the router or specified software module.

If no optional parameters are specified, the current default configuration file (set with the SET CONFIG command on page 1-80) is displayed, along with information about how the current configuration in the router was obtained (Figure 1-13 on page 1-99, Table 1-14 on page 1-99).

The DYNAMIC parameter displays the current dynamic configuration of the router, or of the specified software module. The information displayed is the sequence of router commands required to recreate the current dynamic configuration.

Figure 1-13: Example output from the SHOW CONFIG command.

```
Boot configuration file: boot.cfg (exists)
Current configuration: boot.cfg
```

Table 1-14: Parameters displayed in the output of the SHOW CONFIG command.

Parameter	Meaning
Boot configuration file	The current boot configuration file set with the SET CONFIG command on page 1-80, and whether or not the file exists; one of:
	“Not set”: The boot configuration file has not been set
	“<*filename*> (exists)”: The boot configuration file has been set to <*filename*> and <*filename*> exists.
	“<*filename*> (doesn’t exist)”: The boot configuration file has been set to <*filename*> but <*filename*> does not exist.
Current Configuration	The source of the current configuration; one of:
	“None”: The router booted up with no configuration, because there was no configuration file set, the file `boot.cfg` was not found, the DIP switches were not set for a special configuration and there is no NVS in the router to upgrade from (or the router release is for a newer model that does not have NVS); or the user entered “s” or “S” in response to the “Force EPROM download” message.
	“NVS”: The router booted up using the configuration stored in old NVS tables, because there was no configuration file set, the file `boot.cfg` was not found and the DIP switches were not set for a special configuration; or the user entered “n” or “N” in response to the “Force EPROM download” message.

Table 1-14: Parameters displayed in the output of the SHOW CONFIG command.

Parameter	Meaning
Current configuration *(continued)*	"<*filename*> (warm restart)": The router booted up using <*filename*>, but this was a warm restart (RESTART ROUTER CONF=<*filename*>).
	"None (file not found)": The router booted up with no configuration because the required configuration file was not found. Note that RESTART ROUTER CONF=<*filename*> and SET CONF=<*filename*> check that the file exists, but it is possible to execute a SET CONF command, and then delete the file!
	"<*filename*>": The router booted from the <*filename*> configuration file. This is the normal case.
	"Receiver sensitivity test script (DIP switch)": The router's DIP switches are set to force the router to execute a configuration for factory testing. This case should never be seen.
	"Remote configuration script (DIP switch)": The router's DIP switches are set to execute a special configuration designed to allow a manager to dial in and configure the router. There are two DIP switch settings that can cause this message. One forces this configuration always, the other only runs the special configuration if a valid configuration file is not found (either one set or `boot.cfg`).
	"<file> (default)": The router booted from the default configuration file, `boot.cfg`, because a configuration file has not been set. The router looks for `boot.cfg` in NVS first, then in FLASH.

Examples To display the default configuration file, use the command:

```
SHOW CONFIG
```

To display the current dynamic configuration of the router, use the command:

```
SHOW CONFIG DYNAMIC
```

To display the current dynamic configuration of just the IPX routing software, use the command:

```
SHOW CONFIG DYNAMIC=IPX
```

See Also RESTART
CREATE CONFIG
SET CONFIG

SHOW CPU

Syntax `SHOW CPU`

Description This command displays CPU utilisation since the router last restarted (Figure 1-14 on page 1-101, Table 1-15 on page 1-101).

Figure 1-14: Example output from the SHOW CPU command.

```
CPU Utilisation ( as a percentage )
----------------------------------------
Maximum since router restarted ..... 62
Average since router restarted ..... 0
Average over last minute ........... 0
Average over last 10 seconds ....... 2
Average over last second ........... 1
----------------------------------------
```

Table 1-15: Parameters displayed in the output of the SHOW CPU command.

Parameter	Meaning
Maximum since router restarted	The maximum CPU utilisation recorded since the router restarted.
Average since router restarted	The average CPU utilisation recorded since the router restarted, as a percentage of total CPU capacity.
Average over last minute	The average CPU utilisation over the last minute, as a percentage of total CPU capacity.
Average over last 10 seconds	The average CPU utilisation over the last 10 seconds, as a percentage of total CPU capacity.
Average over last second	The average CPU utilisation over the last second, as a percentage of total CPU capacity.

See Also SHOW BUFFER

SHOW DEBUG

Syntax `SHOW DEBUG [STACK]`

Description This command displays a snapshot of the state of the router immediately prior to the last fatal condition, and is used for debugging purposes. If the command is used without the STACK parameter, it generates the same output as the following sequence of commands, in addition to a stack dump:

```
SHOW SYSTEM
SHOW FILES
SHOW INSTALL
SHOW FEATURE
SHOW RELEASE
SHOW CONFIGURATION DYNAMIC
SHOW BUFFER SCAN
SHOW CPU
SHOW LOG
SHOW EXCEPTION
SHOW FFILE CHECK
```

If the STACK parameter is used, the output depends on whether the last fatal condition was a hardware reset or a software reboot. After a software reboot, the output is a stack dump only (Figure 1-15 on page 1-102). After a hardware reset, no stack dump information is available (Figure 1-16 on page 1-102).

Figure 1-15: Sample output from the SHOW DEBUG STACK command after a software reboot

```
------------------------------------------------------
This is a production version of code
------------------------------------------------------

Router RESTART occurred
Check exception table for restart cause

STACK DUMP
------------------------------------------------------

00012830: 00000001 00000001 00000001 00000001
00012840: 00010000 00000001 00000010 00000000
00012850: 0004c300 004c29f0 0001289c 0000e9a8
00012860: 0000e990 004bea9c 0001287c 00012004
00012870: 20040005 19c20084 00000000 000128d8
00012880: 00090c58 00000000 00090c2c 00000010
00012890: 0000e990 00000000 002aa284 004b0318
000128a0: 00000000 00000000 00000000 00000001
000128b0: 00000001 002b2660 0001294c 000128d4
000128c0: 004bea9c 0027c164 004bea9c 002b2850
000128d0: 000128d8 002b2850 004b030a 00000007
000128e0: 00000000 00000000 00000000 00000010
000128f0: 00000001 00000483 004b029c 00000000
00012900: 004bea9c 07400000 0009bcd6 004bea9c
00012910: 002b2660 0001294c 004b030a 0000003f
00012920: 00317567 00000fd5 00000023 00000014
00012930: 00000001 00000022 00317571 00000010
00012940: 00000000 00317572 004b030a 00287170
00012950: 0047c29c 0000030c 00000000 00000010
00012960: 00400100 00000006 00000000 000115a4
00012970: 000115a8 004b029c 0009bb78 00000010
00012980: 004b029c 00000000 00000001 00000010
00012990: 00000001 004b029c 00000484 0009bb34
000129a0: 000115b4 0028bc74 00000000 00000000
000129b0: 00000000
```

Figure 1-16: Sample output from the SHOW DEBUG STACK command after a hardware reset

```
------------------------------------------------------
This is a production version of code
------------------------------------------------------

Router hardware reset occurred - no debug info
```

See Also SHOW EXCEPTION
SHOW LOG in *Chapter 23, Logging Facility*
SHOW STARTUP
SHOW SYSTEM

SHOW EXCEPTION

Syntax SHOW EXCEPTION

Description This command displays the router exception list (Figure 1-17 on page 1-103).

There may be up to ten entries in the list, ordered from most recent (event 01) to least recent (event 10). The explicit format of each entry depends on the exception type and hence what information was stored for that event.

The *Spurious interrupts* field is the number of spurious interrupts handled by the router since startup. Under normal operating conditions this field should always be zero (0).

The fatal trap with error code of $001e is a CPU software trap that is invoked in response to the RESTART command on page 1-79 and hence should not be considered an error

Figure 1-17: Example output from the SHOW EXCEPTION command.

```
Spurious interrupts = 0

Router exception list
------------------------------------------------------------------------------
No: 01
  Offset/Type : $008/Bus error            Address    : $0019aaee
  Time        : 09:17:19 on 10-May-1997   Clock Log  : 09:16:42 on 10-May-1997
  SSW         : $0225                     Fault Addr : $0d0a0044

No: 02
  Offset/Type : $008/Bus error            Address    : $0019aaee
  Time        : 09:15:26 on 10-May-1997   Clock Log  : 09:14:29 on 10-May-1997
  SSW         : $0225                     Fault Addr : $0d0a0044

No: 03
  Offset/Type : $028/Line A emulator      Address    : $0009624c
  Time        : 10:42:59 on 01-May-1997   Clock Log  : 10:41:22 on 01-May-1997

No: 04
  Offset/Type : $028/Line A emulator      Address    : $0009624c
  Time        : 10:42:59 on 01-May-1997   Clock Log  : 10:41:22 on 01-May-1997

No: 05
  Offset/Type : $028/Line A emulator      Address    : $0009624c
  Time        : 10:42:59 on 01-May-1997   Clock Log  : 10:41:22 on 01-May-1997

No: 06
  Offset/Type : $028/Line A emulator      Address    : $0009624c
  Time        : 10:42:59 on 01-May-1997   Clock Log  : 10:41:22 on 01-May-1997

------------------------------------------------------------------------------
```

SHOW FEATURE

Syntax SHOW FEATURE[={*featurename*|*index*}]

where:

- *featurename* is a character string, 1 to 12 characters in length. Valid characters are any printable character.
- *index* is a decimal number in the range 1 to the number of special feature licences.

Description This command displays information about the special feature licences in the router. If a special feature licence name or index is not specified, summary information about all special feature licences is displayed (Figure 1-18 on page 1-104, Table 1-16 on page 1-104). If a special feature licence name or index is specified, detailed information about the specified special feature licence is displayed (Figure 1-19 on page 1-105, Table 1-17 on page 1-105).

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

Figure 1-18: Example output from the SHOW FEATURE command.

```
The Special Feature licences

Index   FeatureName     Licence        Period
-------------------------------------------------------------
1       ENCO            Full           -
2       Test            30 day Trial   16 aug 1998- 16 sep 1998
3       Test2           password incorrect

The current valid features:

Triple DES Encryption
SW Compression
```

Table 1-16: Parameters displayed in the output of the SHOW FEATURE command.

Parameter	Meaning
Index	The index number for this special feature licence.
FeatureName	The name assigned to the special feature licence with the ENABLE FEATURE command on page 1-65.
Licence	The type of licence; one of "Full", "30 day Trial", or "password incorrect" if an invalid password has been specified with the ENABLE FEATURE command on page 1-65.
Period	The period for which the licence is valid; either a date range for a 30-day trial licence or "-" for a full licence.
The current valid features	A list of the special features enabled by this licence.

Figure 1-19: Example output from the SHOW FEATURE command for a specified special feature licence.

```
The special feature licence : ENCO
Licence Type                : full
Period                      : -


The included features       : 3des Encryption
```

Table 1-17: Parameters displayed in the output of the SHOW FEATURE command for a specified special feature licence.

Parameter	Meaning
The special feature licence	The name assigned to the special feature licence with the ENABLE FEATURE command on page 1-65.
Licence Type	The type of licence; one of "Full", "30 day Trial", or "password incorrect" if an invalid password has been specified with the ENABLE FEATURE command on page 1-65.
Period	The period for which the licence is valid; either a date range for a 30-day trial licence or "-" for a full licence.
The included features	A list of the special features enabled by this licence.

Examples To display a list of all special feature licences, use the command:

```
SHOW FEATURE
```

To display detailed information about special feature licence "Triple DES", use the command:

```
SHOW FEATURE="Triple DES"
```

See Also DISABLE FEATURE
ENABLE FEATURE

SHOW FFILE

Syntax `SHOW FFILE[=`*`file-identifier`*`] [CHECK]`

where:

- *file-identifier* is a valid FFS file identifier of the form `device:filename.ext`. Valid characters are the lowercase letters (a–z), digits (0–9) and the hyphen character (-). Wildcards are allowed in any of the elements.

Description This command displays a list of the files in the FFS that match the specified file identifier (Figure 1-20 on page 1-106, Table 1-18 on page 1-106). If a file identifier is not specified then all files are displayed. Wildcards can be used to replace any part of the file identifier to allow a more selective display. The CHECK parameter specifies that the file data checksums are to be verified.

If the CHECK parameter is specified then the command output may take a number of seconds to complete when larger files are being checked.

Figure 1-20: Example output from the SHOW FFILE command.

```
dev   creator  name      type       size   file date & time     address check
------------------------------------------------------------------------------
flash          aa        cfg        1040  06-May-1997 10:55:31  01E09AA8    -
flash          test      cfg         899  03-Jun-1997 15:38:34  01CC8C6C    -
flash          test1     cfg        1768  01-Jun-1997 00:23:52  01E090F4    -
flash          test3     cfg        2501  08-May-1997 11:44:04  01E0AD50    -
flash          b8        scp        3606  06-May-1997 16:43:59  01E09EF8    -
flash          isdn-d    scp         189  01-Jun-1997 00:27:49  01E0981C    -
flash          mtimea    scp         203  28-Apr-1997 15:09:32  01E0991C    -
flash   inst   release   lic          64  05-May-1997 17:30:45  01E09A28    -
flash   load   28-74ang  pat       36960  01-Jun-1997 00:08:32  01E00054    -
flash   load   28-74tst  pat       10676  23-May-1997 17:18:31  01CC4274    -
flash   load   28-74ang  rel     2019228  13-May-1997 15:50:52  01E0BDE0    -
flash   load   28-74     rez      832632  14-May-1997 20:47:05  01FF8DBC    -
------------------------------------------------------------------------------
flash use:
    files .....   2910628 bytes  (12 files)
    garbage ...      9868 bytes
    free ......   1273808 bytes
    total .....   4194304 bytes
------------------------------------------------------------------------------
```

Table 1-18: Parameters displayed in the output of the SHOW FFILE command.

Parameter	Meaning
dev	The device in which the file is stored.
creator	The module which created the file.
name	The file name.
type	The file type.
size	The size of the file in bytes, as a decimal number.
file date & time	The date and time the file was created.
address	The base address of the file, in hexadecimal.
check	The result of the file data check (if CHECK was specified).
files	The number of bytes of FLASH memory used by valid files.
garbage	The number of bytes of FLASH memory used by deleted files.
free	The number of bytes of FLASH memory free.
total	The total size of FLASH memory.

Examples To display all the patch files created by the Loader module, use the command:

```
SHOW FFILE=FLASH:*.PAT
```

See Also CREATE FFILE
DELETE FFILE

SHOW FILE

Syntax `SHOW FILE[=`*`filename`*`]`

where:

- *filename* is a file identifier of the form `[device:]name.ext`. Valid characters are the lowercase letters (a–z), digits (0–9) and the hyphen character (-). Wildcards are allowed in the name and extension elements.

Description This command displays a list of the files in the file subsystem that match the specified file name (Figure 1-21 on page 1-107, Table 1-19 on page 1-107). Wildcards can be used to replace any part of the file identifier to allow a more selective display. If the file name matches an explicit file and the file is an ASCII text file, the contents of the file are displayed.

Figure 1-21: Example output from the SHOW FILE command.

```
Filename            Device        Size     Created
----------------------------------------------------------------
28-72.pat           flash         111764   05-May-1997 12:41:42
28-74ang.rel        flash         2013756  09-May-1997 15:58:55
28f72-06.pat        flash         123268   18-Apr-1997 15:58:16
release.lic         flash         32       08-May-1997 16:43:49
test.cfg            flash         1698     09-May-1997 10:39:42
config.ins          nvs           32       09-May-1997 10:22:46
----------------------------------------------------------------
```

Table 1-19: Parameters displayed in the output of the SHOW FILE command.

Parameter	Meaning
Filename	The name of the file.
Device	The device on which the file is physically stored; one of “flash” or “nvs”.
Size	The size of the file in bytes, as a decimal number.
Created	The date and time the file was created.

Examples To display all the patch files on the router, use the command:

```
SHOW FILE=*:*.PAT
```

To display the contents of the script file CONFIG.SCP, use the command:

```
SHOW FILE=CONFIG.SCP
```

See Also DELETE FILE

SHOW FLASH

Syntax `SHOW FLASH [FFS]`

Description This command displays general status information about the FLASH File System (FFS). The FFS provides a consistent file-based interface to the physical FLASH memory structure, and housekeeping and management functions (Figure 1-22 on page 1-108, Table 1-20 on page 1-108).

Figure 1-22: Example output from the SHOW FLASH command.

```
FFS info:
global operation ...... none
compaction count ...... 35
est compaction time ... 48 seconds
files ................        328 bytes  (3 files)
garbage ..............     655424 bytes
free .................    1441400 bytes
total ................    2097152 bytes

diagnostic counters:
event      successes        failures
--------------------------------------
get                0              0
open               0              1
read               0              0
close              0              0
complete           0              0
write              0              0
create             0              0
put                0              0
delete             0              0
check              0              0
erase              0              0
compact            0              0
verify             0              0
--------------------------------------
```

Table 1-20: Parameters displayed in the output of the SHOW FLASH command.

Parameter	Meaning
global operation	The global operation currently running; one of "none", "restarting", "erasing", "compacting", or "verifying".
compaction count	The number of times the FLASH has been compacted since the last total erasure.
est compaction time	Estimate of how long compaction would take if it was started now.
files	Amount of space used by valid files.
garbage	Amount of space used by deleted files.
free	Amount of free space.
total	Total FLASH size.
diagnostic counters	Counts of the successes and failures for each type of FFS operation.

FFS failure counts do not necessarily mean that an error has occurred, but are also incremented if the file specified could not be found. For example attempting to delete a file which does not exist will result in the delete failures count being incremented.

See Also ACTIVATE FLASH COMPACTION
SHOW FLASH PHYSICAL

SHOW FLASH PHYSICAL

Syntax `SHOW FLASH PHYSICAL`

Description This command displays physical information about the specific type of FLASH installed in the router (Figure 1-23 on page 1-109, Table 1-21 on page 1-109).

Figure 1-23: Example output from the SHOW FLASH PHYSICAL command.

```
total size ............ 4 MBytes
device type ........... 28F008
devices ............... 4
location .............. SIMM stick
programming power ..... off
block erase time ...... 1600 milliseconds
total erase blocks .... 64
erase block size ...... 128 kBytes
erase bit state ....... 1
page buffers .......... 0
size of page buffer ... 0 bytes
```

Table 1-21: Parameters displayed in the output of the SHOW FLASH PHYSICAL command.

Parameter	Meaning
total size	The amount of FLASH memory installed.
device type	The type of FLASH device installed.
devices	The number of FLASH devices installed.
location	The location of the FLASH memory; one of “SIMM stick” or “built in”.
programming power	The state of programming power; one of “on” or “off”.
block erase time	The time taken to erase an erase block.
total erase blocks	The number of erase blocks.
erase block size	The size of each erase block, in bytes.
erase bit state	The state of an erased bit.
page buffers	The number of page buffers.
size of page buffer	The size of each page buffer, in bytes.

See Also SHOW FLASH

SHOW HTTP CLIENT

Syntax

```
SHOW HTTP CLIENT
```

Description

This command displays the current state of the HTTP client (Figure 1-24 on page 1-110, Table 1-22 on page 1-110).

Figure 1-24: Example output from the SHOW HTTP CLIENT command.

```
HTTP Client
------------------------------------------------------------
  Sessions opened .............. 1
  Sessions closed .............. 1
  Transmitted requests ......... 1
  Received replies ............. 1
------------------------------------------------------------
```

Table 1-22: Parameters displayed in the output of the SHOW HTTP CLIENT command.

Parameter	Meaning
Sessions opened	The number of HTTP client sessions that have been started.
Sessions closed	The number of HTTP client sessions that have been closed.
Transmitted requests	The number of HTTP GET and POST requests transmitted by the client.
Received replies	The number of HTTP responses received by the client.

Examples

To display the current status of the HTTP client, use the command:

```
SHOW HTTP CLIENT
```

See Also

DISABLE HTTP DEBUG
DISABLE HTTP SERVER
ENABLE HTTP DEBUG
ENABLE HTTP SERVER
RESET HTTP SERVER
SET HTTP SERVER
SHOW HTTP CLIENT
SHOW HTTP DEBUG
SHOW HTTP SERVER
SHOW HTTP SESSION

SHOW HTTP DEBUG

Syntax `SHOW HTTP DEBUG`

Description This command displays the debugging options currently enabled for the HTTP server (Figure 1-25 on page 1-111, Table 1-23 on page 1-111).

Figure 1-25: Example output from the SHOW HTTP DEBUG command.

```
Enabled Debug Modes
------------------------------------------------------------
AUTH,MSG
------------------------------------------------------------
Enabled Debug Modes
-------------------------------------------------------
  AUTH,MSG
-------------------------------------------------------
```

Table 1-23: Parameters displayed in the output of the SHOW HTTP DEBUG command.

Parameter	Meaning
Enabled Debug Modes	The debugging modes currently enabled for the HTTP server; one or more of "NONE","AUTH", "MSG", "SESSION" or "ALL".

Examples To display the currently enabled debugging modes for the HTTP server, use the command:

```
SHOW HTTP DEBUG
```

See Also DISABLE HTTP DEBUG
DISABLE HTTP SERVER
ENABLE HTTP DEBUG
ENABLE HTTP SERVER
RESET HTTP SERVER
SET HTTP SERVER
SHOW HTTP CLIENT
SHOW HTTP SERVER
SHOW HTTP SESSION

SHOW HTTP SERVER

Syntax `SHOW HTTP SERVER`

Description This command displays configuration and status information for the HTTP server (Figure 1-26 on page 1-112, Table 1-24 on page 1-112).

Figure 1-26: Example output from the SHOW HTTP SERVER command.

```
HTTP Server
-------------------------------------------------------
  Status ....................... Enabled
  Homepage ..................... homepage.htm
  Listen port .................. Open

  Sessions opened .............. 0
  Sessions closed .............. 0
  Received requests ............ 0
  Unknown requests ............. 0
  Transmitted replies .......... 0
  Authorisation replies ........ 0
  Authorisation sucesses ....... 0
  Authorisation failures ....... 0
------------------------------------------------------
```

Table 1-24: Parameters displayed in the output of the SHOW HTTP SERVER command.

Parameter	Meaning
Status	The status of the HTTP server, one of "Enabled" or "Disabled".
Homepage	The homepage returned by the router when it receives a request that does not specify a page, and when there is no web-based GUI installed.
Listen port	Whether or not the HTTP server's TCP listen port is open: one of "Open" or "Closed".
Sessions opened	The number of HTTP server sessions that have been started.
Sessions closed	The number of HTTP server sessions that have been closed.
Received requests	The number of HTTP GET and POST requests received by the server.
Unknown requests	The number of unrecognised HTTP requests received by the server
Transmitted replies	The number of HTTP responses transmitted by the server.
Authorisation successes	The number of successful authentication attempts received by the server.
Authorisation failures	The number of authentication failures incurred during login attempts. Authentication failures occur when users fail to enter a user name or password when prompted by the browser, or enter an invalid user name or password

Examples To display the current status of the HTTP server, use the command:

```
SHOW HTTP SERVER
```

See Also DISABLE HTTP DEBUG
DISABLE HTTP SERVER
ENABLE HTTP DEBUG
ENABLE HTTP SERVER
RESET HTTP SERVER
SET HTTP SERVER
SHOW HTTP CLIENT
SHOW HTTP DEBUG
SHOW HTTP SESSION

SHOW HTTP SESSION

Syntax

```
SHOW HTTP SESSION
```

Description This command displays TCP session information for the HTTP server (Figure 1-27 on page 1-113, Table 1-25 on page 1-113).

Figure 1-27: Example output from the SHOW HTTP SESSION command.

```
Session    In Use   Type    TCP State      Activations
-----------------------------------------------------------
Session1   TRUE     Server    -            32
Session2   TRUE     Server    -            15
Session3   TRUE     Server    -            7
Session4   TRUE     Server    -            2
Session5   TRUE     Server    -            1
Session6   FALSE    None      -            0
Session7   FALSE    None      -            0
Session8   FALSE    None      -            0
..
Session29  FALSE    None      -            0
Session30  FALSE    None      -            0
```

Table 1-25: Parameters displayed in the output of the SHOW HTTP SESSION command.

Parameter	Meaning
Session	The session ID for a session. A maximum of 30 sessions can be active at any one time.
In Use	Whether or not the session is active; one of “TRUE” or “FALSE.”
Type	The type of session; one of “None” (no active session), “Client” (the session is an outgoing connection from the router’s HTTP client to a remote HTTP server), or “Server” (the session is an incoming connection from a client to the router’s HTTP server).
TCP State	THe current status of the TCP state machine; one of “FREE”, ”CLOSED”, “LISTEN”, “SYNSENT”, SYNRECEIVED”, “ESTABLISHED”, “FINWAIT1”, “FINWAIT2”, “CLOSEWAIT”, “LASTACK”, “CLOSING”, “TIMEWAIT”, OR “DELETE”.

Table 1-25: Parameters displayed in the output of the SHOW HTTP SESSION command. (Continued)

Parameter	Meaning
Activations	The number of times the session has been activated.

Examples To display TCP session information for the HTTP server, use the command:

```
SHOW HTTP SESSION
```

See Also DISABLE HTTP DEBUG
DISABLE HTTP SERVER
ENABLE HTTP DEBUG
ENABLE HTTP SERVER
RESET HTTP SERVER
SET HTTP SERVER
SHOW HTTP CLIENT
SHOW HTTP DEBUG
SHOW HTTP SERVER

SHOW INSTALL

Syntax `SHOW INSTALL`

Description This command shows the install information, which install the router is currently running and the history of checking install information at boot (Figure 1-28 on page 1-114, Table 1-26 on page 1-115).

Figure 1-28: Example output from the SHOW INSTALL command.

```
Install     Release               Patch               Dmp
------------------------------------------------------------------------
Temporary   -                     -                   -
Preferred   flash:8d-181.rez      -                   -
Default     EPROM (8-1.6.0)       -                   -
------------------------------------------------------------------------

Current install
------------------------------------------------------------------------
Preferred   flash:8d-181.rez      -                   -
------------------------------------------------------------------------

Install history
------------------------------------------------------------------------
No Temporary install selected
Preferred install selected
Preferred release successfully installed
Preferred patch successfully installed
------------------------------------------------------------------------
```

Table 1-26: Parameters displayed in the output of the SHOW INSTALL command.

Parameter	Meaning
Install	The type of install; one of "Temporary", "Preferred" or "Default".
Release	The release file for the install.
Patch	The patch file for the install.
Dmp	The third party Data Manipulation Program for the install. This is not present on most models and software releases.
Current install	The install currently running in the router.
Install history	A list of checks the INSTALL module carried out on the install boot. This list shows how the current install came to be selected and loaded.

See Also DELETE INSTALL
SET INSTALL

SHOW LOADER

Syntax `SHOW LOADER`

Description This command displays the default values for the LOADER module and the progress of the current load (Figure 1-29 on page 1-115 and Table 1-27 on page 1-116).

Figure 1-29: Example output from the SHOW LOADER command.

```
Loader Information
------------------------------------------------------------------------------
Defaults:
Method.............. TFTP
File ............... /netupgrades/new.cfg
Server ............. tftp.company.com (192.168.1.1)
HTTP Proxy ......... -
Proxy Port ......... Default ( 80 )
Port ............... -
Destination ........ Flash
Delay (sec) ........ 0

Current Load:
Method.............. HTTP
File ............... /netupgrades/8-200gui.rez
Server ............. www.company.com (192.168.163.22)
TCP Port ........... 80
Destination .......  Flash
Delay (sec) ........ 0
Status ............. Loading
Load Level ......... 0%
------------------------------------------------------------------------------
```

Table 1-27: Parameters displayed in the output of the SHOW LOADER command.

Parameter	Meaning
Defaults	This section lists the default values used for parameters not specified in the LOAD and UPLOAD commands.
Current Load	This section lists the values currently being used to load a file to or from the router.
Last Load	This section lists the values last used to load a file to or from the router.
Method	The method used to load files; one of "TFTP", "HTTP", "WEB", "WWW", "ZMODEM" or "NONE".
File	The name of the file to be loaded.
Server	The IP address or host name of the server. Used only when METHOD is set to TFTP or HTTP.
HTTP Proxy	The IP address or host name of the proxy server when METHOD is set to HTTP and access is via a proxy server.
Proxy Port TCP Port	The port on the proxy server when METHOD is set to HTTP and access is via a proxy server.
Port	The asynchronous port on the router when METHOD is set to ZMODEM or NONE.
Destination	The destination for the file loaded; one of "FLASH" or "NVS".
Delay	The delay, in seconds, to wait before starting to load a file.
Status	The status of the LOADER module; one of "Idle", "Waiting", "Loading", "Load Complete" or "Load Aborted". If the SHOW LOADER command shows a Status of "Load Complete" or "Load Aborted", the next SHOW LOADER command will show a Status of "Idle" (unless another LOAD is initiated first).
Load Level	The progress of the load as a percentage of the file downloaded. This is only displayed if the LOADER Status is "Loading".
Last Message	The last error or informational message sent to the device from which the last LOAD command on page 1-70 was issued. At router boot, the Last Message is undefined and shows as "-". This is not displayed if the LOADER status is "Loading'.

See Also LOAD
SET LOADER
UPLOAD

SHOW MAIL

Syntax `SHOW MAIL`

Description This command displays the current configuration of the email system, and any email messages that are currently queued for transmission.

Figure 1-30: Example output from the SHOW MAIL command

```
MAIL
  Host Name ............ router2.company.com
  State ................ alive
  Debug ................ disabled
  Mails Sent ........... 0

Date/Time   Id    To                   Subject             State      Retries
-----------------------------------------------------------------------------
29 15:00:05 0002  jb@it.company.com    Test Message        Open       0
-----------------------------------------------------------------------------
```

Table 1-28: Parameters displayed in the output of the SHOW MAIL command.

Parameter	Meaning
Host Name	The host name used by the mail system.
State	The state of the mail system; one of “alive”, “DEAD - name server not set” or “DEAD - hostname not set”.
Debug	Whether or not debugging is enabled for the mail system; one of “enabled” or “disabled”.
Mails Sent	The number of mail messages transmitted since the last router restart.
Date/Time	The date and time the message was queued for transmission.
Id	The unique message id for the message.
To	The email address to which the message is to be sent.
Subject	The contents of the subject field in the message header.
State	The state of the transmission process; one of: “initial” Starting “get MX-IP” Performing DNS lookup on MX record “get IP” Performing DNS lookup “Connect” TCP connection established “S-helo” Sending HELO command “S-from” Sending MAIL FROM command “S-rcpt” Sending RCPT TO command “S-data” Sending DATA command “S-header” Sending headers “S-file” Sending file “S-buffer” Sending message text “S-last” Sending dot to terminate message “S-done” Sending message transmission “S-quit” Sending QUIT command
Retries	The number of times the mail system has re-transmitted the message because an acknowledgement was not received from the remote mail system.

Examples To show the state of the email system, use the command:

```
SHOW MAIL
```

See Also

DELETE MAIL
DISABLE MAIL DEBUG
ENABLE MAIL DEBUG
MAIL
SHOW MAIL

SHOW MANAGER PORT

Syntax

```
SHOW MANAGER PORT
```

Description

This command displays the port number of the current semipermanent manager port, if any. There may be no more than one semipermanent manager port at any time. If a semipermanent manager port is defined, a message like:

```
The manager port is port 0
```

is displayed. If no semipermanent manager port is defined, the message:

```
No manager port is defined.
```

is displayed.

See Also

LOGIN
SET MANAGER PORT
SET PORT in *Chapter 2, Interfaces*

SHOW NVS

Syntax

```
SHOW NVS [BLOCK=id [INDEX=index]]
```

where:

- *id* is a block ID number in hexadecimal.
- *index* is a block index number in hexadecimal.

Description

This command shows the contents of the nonvolatile storage (NVS). If the BLOCK parameter is specified then only blocks with the specified *id* are shown. If the INDEX parameter is specified then only the block with the specified *id* and *index* are shown (Figure 1-31 on page 1-119, Table 1-29 on page 1-119).

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

Figure 1-31: Example output from the SHOW NVS command.

```
Block     Index     Size      Creation     Creator   Block
ID                  (bytes)   Date         ID        Address
--------------------------------------------------------------
00000044  00000000  00000048  01-May-1997  00000026  01200028
0000001a  00000002  00000178  01-May-1997  00000012  01200098
0000002e  00000002  0000002c  01-May-1997  0000001e  01200238
00000032  00000003  00000050  01-May-1997  00000022  0120028c
00000040  00000000  00000f00  01-May-1997  00000002  01200304
00000014  00000000  0000043c  01-May-1997  0000000e  0120122c
00000027  00000000  00000030  01-May-1997  0000001a  01201690
00000022  00000000  0000000c  01-May-1997  00000011  012016e8
00000015  00000000  00000020  01-May-1997  0000000f  0120171c
00000018  0000003f  00000028  01-May-1997  0000000f  01201764
00000016  00000000  000001ec  01-May-1997  00000010  012017b4
00000018  00000000  00000028  01-May-1997  0000000f  012019c8
00000019  00000005  00000070  01-May-1997  00000011  01201a18
0000002f  00000002  00000040  01-May-1997  0000001f  01201ab0
0000002f  00000004  00000000  01-May-1997  0000001f  01201b18
0000002e  00000001  000000f4  01-May-1997  0000001e  01201b40
00000024  00000001  00000000  01-May-1997  00000018  01201c5c
00000024  00000003  00000044  01-May-1997  00000018  01201c84
00000024  00000004  000000c8  01-May-1997  00000018  01201cf0
00000009  00000001  00000018  01-May-1997  00000006  01201de0
00000009  00000002  00000060  01-May-1997  00000006  01201e20
00000038  00000000  00000000  01-May-1997  00000021  01203068
00000031  00000001  00000070  01-May-1997  00000021  01203090
0000000b  00000000  000000a0  01-May-1997  00000008  01203128
0000000b  00000001  000007a0  01-May-1997  00000008  012031f0
0000000c  00000000  0000010e  01-May-1997  00000008  012039b8
0000003d  00000000  0000003c  01-May-1997  00000025  01203af0
00000024  0000000e  00000100  01-May-1997  00000018  01203b54
0000001a  00000003  0000001a  01-May-1997  00000012  01203c7c
00000032  00000002  00000050  08-May-1997  00000022  01203cc0
00000043  00000001  00000058  09-May-1997  00000029  01203d38
00000045  000003fd  00000024  10-May-1997  00000026  01203db8
00000045  000003fc  00000de4  10-May-1997  00000026  01203e04
--------------------------------------------------------------
```

Table 1-29: Parameters displayed in the output of the SHOW NVS command.

Parameter	Meaning
Block ID	The ID of the block in hexadecimal.
Index	The index of the block in hexadecimal.
Size (bytes)	The size of the block in hexadecimal bytes.
Creation Date	The date the block was created. "**-***-**" indicates that the date was undefined when the block was created.
Creator ID	The ID of the module that created the block.
Block Address	A pointer to battery backed RAM where the block starts.

See Also

SET NVS CLEAR_TOTALLY
SET NVS CREATE
SET NVS DELETE
SET NVS MODIFY
SHOW NVS FREE
SHOW NVS DUMP

SHOW NVS DUMP

Syntax SHOW NVS DUMP [BLOCK=*id*] [INDEX=*index*] [LENGTH=*length*] [OFFSET=*offset*] [SIZE={BYTE|LONG|WORD}]

where:

- *id* is the block ID in hexadecimal.
- *index* is the block index in hexadecimal.
- *length* is the length of data to be dumped in hexadecimal.
- *offset* is the offset into the data to start dumping from in hexadecimal.

Description This command dumps data from a nonvolatile storage (NVS) block (Figure 1-32 on page 1-120, Table 1-30 on page 1-121). The SIZE parameter specifies whether the data should be displayed grouped as BYTEs, LONGWORDs or WORDs. BLOCK, INDEX, LENGTH, OFFSET, SIZE are compulsory the first time the command is used after a reboot; thereafter they are optional, and if not specified, the values from the previous invocation are used. If OFFSET is not specified then the dump will continue from the end of the previous display. If OFFSET is specified without a value the value from the previous invocation is used.

Figure 1-32: Example output from the SHOW NVS DUMP command.

```
ID: 00000001  Index : 00000001  Offset: 00000000  Length: 00000100  Size: LONG

Offset    Data                                             ASCII
----------------------------------------------------------------------------
00000000  00010001 00020006 636f6d6d 6f6e0000              ........common..
00000010  00000000 00000000 00000001 0010ae30              ...............0
00000020  00113f8b 000720f2 00064ef9 0010b84a              ..?... ...N....J
00000030  00242876 000726b8 00064ef9 0010b0b0              .$(v..&...N.....
00000040  002426a2 00072ee0 00064ef9 0010ae30              .$&.......N....0
00000050  00242c4a 00073054 00064ef9 0010b6b8              .$,J..0T..N.....
00000060  00243646 000798c8 00064ef9 0010ae48              .$6F......N....H
00000070  0024964a 0007a644 00064ef9 0010b200              .$.J...D..N.....
00000080  0024a77e 0007a6f0 00064ef9 0010b060              .$.~......N....`
00000090  0024a68a 0007f588 00064ef9 0010b278              .$........N....x
000000a0  0024f73a 00083be8 00064ef9 001113f0              .$.:..;...N.....
000000b0  00249f14 00086d3c 00064ef9 00111a68              .$....m<..N....h
000000c0  0024d6e0 00088542 00064ef9 00110900              .$.....B..N.....
000000d0  0024dd7e 00098b66 00064ef9 0010cc48              .$.~...f..N....H
000000e0  0024a6ea 00098f44 00064ef9 0010cf62              .$.....D..N....b
000000f0  0024ade2 00099a14 00064ef9 0010c984              .$........N.....
----------------------------------------------------------------------------
```

Table 1-30: Parameters displayed in the output of the SHOW NVS DUMP command.

Parameter	Meaning
ID	The block ID (in hexadecimal) of the block displayed.
Index	The block index in (hexadecimal) of the block displayed.
Offset	The offset (in hexadecimal) of the data displayed.
Length	The length of data in (hexadecimal) displayed.
Size	The units in which the data is displayed: one of “BYTE“, “LONG” or “WORD”.
Offset	The offset of the current record from the ID, Index and Offset specified in the header.
Data	The data.
ASCII	An ASCII representation of the data.

See Also

SET NVS CREATE
SET NVS DELETE
SET NVS MODIFY
SHOW NVS
SHOW NVS FREE

SHOW NVS FREE

Syntax

```
SHOW NVS FREE
```

Description

This command shows how much free space there is in the nonvolatile storage (NVS) and the size of the largest block that can be created (Figure 1-33 on page 1-121).

Figure 1-33: Example output from the SHOW NVS FREE command.

```
Total free space in NVS (bytes)         000150e4
Size of the largest free block (bytes)  000150bc
```

See Also

SET NVS CLEAR_TOTALLY
SET NVS CREATE
SET NVS DELETE
SET NVS MODIFY
SHOW NVS
SHOW NVS DUMP

SHOW PATCH

Syntax SHOW PATCH

Description This command displays all patch files stored in NVS (Figure 1-34 on page 1-122, Table 1-31 on page 1-122). Patch or release files stored in FLASH are not displayed; these can be displayed with the SHOW FILE command on page 1-107.

Figure 1-34: Example output from the SHOW PATCH command.

```
Patch files
Name             Device     Size      Version
---------------------------------------------
28-74.pat        flash      376032    7.4.0-11
28760-02.paz     flash      109644    7.6.0-02
---------------------------------------------
```

Table 1-31: Parameters displayed in the output of the SHOW PATCH command.

Parameter	Meaning
Name	The name of the patch file.
Device	The device on which the patch is physically stored; one of “flash” or “nvs”.
Size	The size of the patch file in bytes, expressed as a decimal number.
Version	The version number of the patch, consisting of the version number of the release to which the patch applies, followed by a hyphen and the generation number of the patch itself.

See Also LOAD
DESTROY PATCH

SHOW RADIUS

Syntax SHOW RADIUS

Description This command displays the list of known RADIUS servers (Figure 1-35 on page 1-122, Table 1-32 on page 1-123). RADIUS servers are used for user authentication.

Figure 1-35: Example output from the SHOW RADIUS command.

```
Server           Port  AccPort  Secret
--------------------------------------
192.168.17.11    1645     1646  ******
172.31.253.9     1645        0  ******
--------------------------------------
```

Table 1-32: Parameters displayed in the output of the SHOW RADIUS command.

Parameter	Meaning
Server	The IP address of this RADIUS server.
Port	The port number used to communicate with the RADIUS authentication server.
AccPort	The port number used to communicate with the RADIUS accounting server.
Secret	The shared secret used in communications between the router and the RADIUS server. Asterisks are displayed to prevent accidental discovery by unauthorised users.

Examples To displays the list of known RADIUS servers, use the command:

```
SHOW RADIUS
```

See Also ADD RADIUS SERVER
DELETE RADIUS SERVER

SHOW RELEASE

Syntax `SHOW RELEASE`

Description This command shows the release licence information in the router (Figure 1-36 on page 1-123, Table 1-33 on page 1-123). All releases that have a licence are displayed, along with the status of the licence.

Figure 1-36: Example output from the SHOW RELEASE command.

```
Release                  Licence        Period
------------------------------------------------------------------
flash:load\28-74ang.rel   full           -
flash:load\28-761.rel     30 day trial   10-May-1998 to 10-Jun-1998
------------------------------------------------------------------
```

Table 1-33: Parameters displayed in the output of the SHOW RELEASE command.

Parameter	Meaning
Release	The full name of the release file.
Licence	The licence type, one of “full” or “30-day trial”.
Period	The period of the licence if it is a 30-day trial licence.

See Also DISABLE RELEASE
ENABLE RELEASE

SHOW STARTUP

Syntax SHOW STARTUP

Description This command prints the state of the bits in the router Startup Status Flag (Figure 1-37 on page 1-124). This command can be used to check the state of the router when it last started up. If a given bit signals an error then its message has an > appended to the front of it.

Figure 1-37: Example output from the SHOW STARTUP command.

```
Router Startup Status Flag is 00600040, which means:
----------------------------------------------------
   4096k of RAM found
> Router CRASHED prior to this startup
  Battery backed RAM battery OK
  Battery backed RAM not corrupted
  Real time clock not corrupted
  Real time clock, time set
  Router software download OK
  Router vector download OK
----------------------------------------------------
```

SHOW SYSTEM

Syntax SHOW SYSTEM

Description This command displays general system information about the router, including the hardware installed, memory, software release and patches loaded (Figure 1-38 on page 1-125, Table 1-34 on page 1-125). It will also display location and contact details if these have been set with the appropriate SET SYSTEM command.

Figure 1-38: Example output from the SHOW SYSTEM command.

```
Router System Status                            Time 17:10:06 Date 25-Sep-1999.
Board      ID  Bay Board Name                      Rev   Serial number
--------------------------------------------------------------------------------
Base       62      AR720                           M1-0  6845218
IC Module  40   0  AR022 PIC Eth                   M2-0  6844595
IC Module  38   1  AR023 PIC Sync                  M1-1  6844715
MAC        67      AR012 CMAC                      M2-0  33636409
--------------------------------------------------------------------------------
Memory -   DRAM : 16384 kB    FLASH :  4096 kB
--------------------------------------------------------------------------------
SysDescription
CentreCOM AR720 version 1.8.1-00 08-Sep-1999
SysContact
David Johns, ext 8331
SysLocation
Laboratory, First Floor, Head Office Building
SysName
LAB
SysUpTime
250074 ( 00:41:40 )
Software Version: 1.8.1-00 08-Sep-1999
Release Version : 1.8.1-00 08-Sep-1999
Patch Installed : NONE
Territory       : europe
Help File       : help.hlp

Boot configuration file: load.cfg (exists)
Current configuration: load.cfg
Security Mode   : Disabled

Patch files
Name            Device     Size      Version
--------------------------------------------
52772-02.paz    flash      94856     7.7.2-2
--------------------------------------------
```

Table 1-34: Parameters displayed in the output of the SHOW SYSTEM command.

Parameter	Meaning
Board	The board type; one of “Base”, “Expansion”, “Engine”, “GenericIO”, “IO Module”, “IC Module” or “MAC”.
ID	The identification number of the board.
Bay	The bay number in which the ICM or IOM expansion card is installed.
Board Name	The descriptive name of the board.
Rev	The revision number and hardware modification level of the board.
Serial number	The serial number of the board.
DRAM	The amount of DRAM memory installed.
FLASH	The amount of FLASH memory installed.
SysDescription	A description of the product and software release.
SysContact	A string specifying a contact name or address to call for the router. This is set with the SET SYSTEM CONTACT command on page 1-89.

Table 1-34: Parameters displayed in the output of the SHOW SYSTEM command. (Continued)

Parameter	Meaning
SysLocation	A string specifying the location of the router. This is set with the SET SYSTEM LOCATION command on page 1-90.
SysName	A string specifying the name (usually the complete IP domain name) of the router. This is set with the SET SYSTEM NAME command on page 1-90.
SysUpTime	The elapsed time, in 100ths of a second, since the last router restart.
Software Version	The patch version running on the router.
Release Version	The software release running on the router.
Patch Installed	A description of the patch currently installed, or “NONE” of no patch is installed.
Territory	The territory in which the router is being used; one of “australia”, “china”, “europe”, “japan”, “korea”, “newzealand” or “usa”. This can be set with the SET SYSTEM TERRITORY command on page 1-91.
Help File	The system help file, used by the HELP command on page 1-69 for online help. This can be set with the SET HELP command on page 1-80.
Main PSU	The current state of the router’s internal power supply unit (PSU); one of “On” or “***OFF***”. Only displayed on models that support power supply monitoring.
Main Fan	The current state of the router’s internal fan; one of “On” or “***OFF***”. Only displayed on models that support power supply monitoring.
RPS Monitor	Whether or not RPS monitoring is enabled; one of “On” or “Off”. Only displayed on models that support RPS monitoring.
RPS Connected	Whether or not an RPS is connected; one of “Yes” or “***NO***”. Only displayed on models that support RPS monitoring, when RPS monitoring is enabled.
RPS PSU	The current state of the RPS power supply unit; one of “On” or “***OFF***”. Only displayed on models that support redundant power supply (RPS) monitoring, when an RPS is connected and RPS monitoring is enabled.
RPS Fan	The current state of the RPS fan; one of “On” or “***OFF***”. Only displayed on models that support redundant power supply (RPS) monitoring, when an RPS is connected and RPS monitoring is enabled.
Boot configuration file	The current boot configuration file set with the SET CONFIG command on page 1-80 and whether or not the file exists (Table 1-14 on page 1-99).
Current configuration	The source of the current router configuration. This can be one of a number of items, including a configuration file name, NVS, no configuration or configuration set by DIP switches (Table 1-14 on page 1-99).
Security Mode	Whether or not security mode is enabled; one of “Enabled” or “Disabled”.
Patch files	Information about the patch files installed on the router, or the message “Warning (248283): No patches found.”.

Table 1-34: Parameters displayed in the output of the SHOW SYSTEM command. (Continued)

Parameter	Meaning
Name	The name of a patch file.
Device	The memory device where the patch file is stored; one of “nvs” or “flash”.
Size	The size of the patch file in bytes.
Version	The version number of the patch, consisting of the version number of the release to which the patch applies, followed by a hyphen and the generation number of the patch itself.

See Also DISABLE SYSTEM SECURITY_MODE
ENABLE SYSTEM SECURITY_MODE
SET HELP
SET SYSTEM CONTACT
SET SYSTEM LOCATION
SET SYSTEM NAME
SET SYSTEM RPSMONITOR
SET SYSTEM TERRITORY

SHOW TACACS SERVER

Syntax `SHOW TACACS SERVER`

Description This command displays the list of TACACS servers used for authenticating login names (Figure 1-39 on page 1-127).

Figure 1-39: Example output from the SHOW TACACS SERVER command.

```
TACACS server addresses
-----------------------
192.168.35.17
192.168.163.30
-----------------------
```

See Also ADD TACACS SERVER
DELETE TACACS SERVER

SHOW TIME

Syntax `SHOW TIME`

Description This command displays the current router time as maintained by the real-time clock. The message displayed looks like:

```
System time is 09:18:05 on 10-Jun-1997
```

See Also SET TIME

SHOW USER

Syntax

```
SHOW USER[=login-name] [CONFIGURATION]
```

where:

- *login-name* is a character string, 1 to 64 characters in length. Valid characters are uppercase letters (A–Z), lowercase letters (a–z), and decimal digits (0–9). The string may not contain spaces.

Description This command displays the contents of the User Authentication Database or global configuration parameters and counters for the User Authentication Facility.

For a user with MANAGER or SECURITY OFFICER privilege, the command displays the contents of the User Authentication Database. If the router is in SECURITY MODE the command also displays the number of users currently logged in with SECURITY OFFICER privilege. If a login name is specified, information for the specified user is displayed. If a login name is not specified the entire database is displayed (Figure 1-40 on page 1-129, Table 1-35 on page 1-129). For a user with USER privilege, parameters are not allowed, and the user’s own database record is displayed.

The CONFIGURATION parameter displays global configuration parameters and counters for the User Authentication Facility (Figure 1-41 on page 1-130, Table 1-36 on page 1-130). A login name may not be specified with the CONFIGURATION parameter.

Figure 1-40: Example output from the SHOW USER command.

```
Number of logged in Security Officers currently active ...1

User Authentication Database
-------------------------------------------------------------------------------
Username: tony ()
   Status: enabled    Privilege: user      Telnet: no
   Ip address: 192.168.1.5      Netmask: 255.255.255.0    Mtu: 1500
   Logins: 2          Fails: 0        Sent: 0           Rcvd: 0
Username: dave ()
   Status: enabled    Privilege: Sec Off   Telnet: yes
   Callback number: 0061393546786   Calling number: 5554491
   Logins: 2          Fails: 1        Sent: 0           Rcvd: 0
Username: manager (Manager Account)
   Status: enabled    Privilege: manager      Telnet: yes
   Logins: 4         Fails: 0        Sent: 0           Rcvd: 0
-------------------------------------------------------------------------------

Active (logged in) Users
------------------------

User           Port/Device    Location         Login Time
----           -----------    --------         ----------
manager        Port 0         local            10:16:08 03-Jul-2000
dave           Telnet 1       192.168.1.7      10:15:47 03-Jul-2000
manager        Telnet 2       192.168.2.3      10:16:08 03-Jul-2000
```

Table 1-35: Parameters displayed in the output of the SHOW USER command.

Parameter	Meaning
User Authentication Database	This section shows the contents of the User Authentication Database
Number of logged in Security Officers currently active	The number of users currently logged in with SECURITY OFFICER privilege. This counter does not include users whose SECURITY OFFICER privilege is disabled because they have not entered a security command within the SECUREDELAY period.
Username	The login name.
Status	The current status of the entry; one of “enabled” or “disabled”.
Privilege	The privilege level for this user; one of “Sec Off”, “manager” or “user”.
Telnet	Whether or not the user is permitted to use the TELNET command to telnet to a host; one of “yes” or “no”.
IP address	The IP address for this user.
Netmask	The network mask for this user.
Mtu	The MTU for this user.
IPX network	The Novell network number assigned to the user. This field is not present if a network number has not been assigned.
Callback number	The ISDN phone number for this user when making a call back to a remote user.
Calling number	The number to check against the incoming calling number of an L2TP or ISDN call, if the call provides caller ID information.

Table 1-35: Parameters displayed in the output of the SHOW USER command.

Parameter	Meaning
Logins	The number of times a successful login has been made using this login name.
Fails	The number of times an incorrect password was given for this login name.
Sent	The number of octets sent by the user to the router.
Rcvd	The number of octets set to the user from the router.
Active (logged in) Users	This section summarises the users currently logged in.
user	The login name of the user.
Port/Device	The port or device on the router that the user is logged in to; one of 'Port x', Telnet x' or 'SSH x', where x is the device instance.
Location	The location of the user, either 'local' if the user is attached to an asynchronous port or the IP address of the remote device.
Login Time	The time the user most recently logged in.

Figure 1-41: Example output from the SHOW USER CONFIGURATION command.

```
User Authentication Facility configuration and counters
--------------------------------------------------------------------------------
Security parameters
  login failures before lockout ...........     4            (LOGINFAIL)
  lockout period ..........................    20 seconds    (LOCKOUTPD)
  manager password failures before logoff ..    3            (MANPWDFAIL)
  maximum security command interval ........   30 seconds    (SECUREDELAY)
  minimum password length .................     6 characters (MINPWDLEN)
  TACACS retries ..........................     3            (TACRETRIES)
  TACACS timeout period ...................     5 seconds    (TACTIMEOUT)
  semi-permanent manager port .............     0
Security counters
  logins                           7     databaseClearTotallys            0
  managerPwdChanges                0     defaultAcctRecoveries            0
  unknownLoginNames                1     tacacsLoginReqs                  1
  totalPwdFails                    5     tacacsLoginRejs                  1
  managerPwdFails                  3     tacacsReqTimeouts                0
  securityCmdLogoffs               1     tacacsReqFails                   0
  loginLockouts                    1
--------------------------------------------------------------------------------
```

Table 1-36: Parameters displayed in the output of the SHOW USER CONFIGURATION command.

Parameter	Meaning
login failures before lockout	The default number of login failures allowed by a user before the login prompt is withheld for the lockout period.
lockout period	The default lockout period, in seconds, that the login prompt will be withheld from a user after a number of consecutive login failures.

Table 1-36: Parameters displayed in the output of the SHOW USER CONFIGURATION command. (Continued)

Parameter	Meaning
manager password failures...	The default number of successive failures a manager may make entering the login password before the session is logged off.
maximum security command...	The default interval, in seconds, that may elapse between successive secure commands without the manager being prompted to re-enter the login password.
minimum password length	The default value for the minimum password length.
TACACS retries	The default value for the number of times a TACACS request will be retransmitted if a response is not received within the timeout period.
TACACS timeout period	The default value, in seconds, that the router will wait for a TACACS response before retransmitting the request.
semi-permanent manager port	The port number of the semipermanent manager port.
logins	The total number of logins by any user to the router.
managerPwdChanges	The number of times a manager privilege level password has been changed.
unknownLoginNames	the number of attempted logins with a login name that did not exist in the database and was not validated by a TACACS server.
totalPwdFails	The total number of times an incorrect password was given for a login name that exists in the database.
managerPwdFails	The number of times a manager was challenged to give their password for a security command and they entered the incorrect password.
securityCmdLogoffs	The number of times a manager was logged off because a correct password was not entered when required to validate a security command.
loginLockouts	The number of times the login lockout period was instigated because too many unsuccessful login attempts were made.
databaseClearTotallys	The number of times the database has been cleared.
defaultAcctRecoveries	The number of times the router was rebooted with DIP switch 3 set to restore the default account passwords.
tacacsLoginReqs	The number of login requests made to a TACACS server.
tacacsLoginRejs	The number of rejects received from a TACACS server in response to a login request.
tacacsReqTimeouts	the number of login requests to a TACACS server that terminated in a timeout.
tacacsReqFails	The number of login attempts terminated because of TACACS server timeouts.

See Also

ADD USER
DELETE USER
DISABLE SYSTEM SECURITY_MODE
DISABLE USER
ENABLE SYSTEM SECURITY_MODE
ENABLE USER
PURGE USER
RESET USER
SET USER

SHOW USER RSO

Syntax

```
SHOW USER RSO
```

Description

This command displays information about the current state of Remote Security Officer access and the log of access events (Figure 1-42 on page 1-132, Table 1-37 on page 1-133).

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

Figure 1-42: Example output from the SHOW USER RSO command.

```
Remote Security Officer Access is enabled.

Remote Security Officer Log
-----------------------------------------------------------
Remote Security Officer ... 203.97.65.4/255.255.255.255
Failed Logins ............. 5
Last failed login ......... 29-Apr-1998 14:33:50
Successful Logins ......... 3
Last successful login ..... 29-Apr-1998 14:34:23
-----------------------------------------------------------
Remote Security Officer ... 192.168.5.0/255.255.255.0
Failed Logins ............. 1
Last failed login ......... 28-Apr-1998 23:33:50
Successful Logins ......... 0
Last successful login ..... **-***-**** **:**:**
-----------------------------------------------------------
Remote Security Officer ... 203.197.165.114/255.255.255.252
Failed Logins ............. 0
Last failed login ......... -
Successful Logins ......... 0
Last login ................ **-***-**** **:**:**
-----------------------------------------------------------


Illegal Login attempts
IP address         Date/time               Attempts
---------------------------------------------------
202.50.100.3       15-Apr-1998 14:21:21         1
129.54.214.34      12-Mar-1998 21:34:23         2
---------------------------------------------------
```

Table 1-37: Parameters displayed in the output of the SHOW USER RSO command.

Parameter	Meaning
Remote Security Officer Access is...	The current state of Remote Security Officer access; one of "enabled" or "disabled".
Remote Security Officer Log	The list of Remote Security Officers and a log of access events for those Remote Security Officers.
Remote Security Officer	The address range (IP address and mask) of a Remote Security Officer. A mask other than 255.255.255.255 defines a range of Remote Security Officer addresses.
Failed logins	The number of failed login attempts by users in the Remote Security Officer address range.
Last failed login	The date and time of the last failed login attempt, or "`**-***-**** **:**:**`" if there have been no failed login attempts.
Successful logins	The number of successful login attempts by users in the Remote Security Officer address range.
Last successful login	The date and time of the last successful login attempt, or "`**-***-**** **:**:**`" if there have been no successful login attempts.
Illegal login attempts	A log of illegal login attempts from IP addresses not in one of the defined Remote Security Officer address ranges.
IP address	The IP address from which the Telnet session originated.
Date/time	The date and time of the login attempt.
Attempts	The number of attempts made from this IP address.

Examples To display the log of Remote Security Officer access events, use the command:

```
SHOW USER RSO
```

See Also ADD USER RSO
DELETE USER RSO
DISABLE USER RSO
ENABLE USER RSO

UPLOAD

Syntax

```
UPLOAD [METHOD=TFTP] [FILE=filename] [SERVER={hostname|
    ipadd}]

UPLOAD [METHOD=ZMODEM] [FILE=filename] [PORT=port]
```

where:

- *filename* is the name of the file to upload. This may be a full path name for the file in the syntax of the TFTP server.
- *ipadd* is an IP address in dotted decimal notation.
- *hostname* is a character string up to 40 characters in length.
- *port* is the number of an asynchronous port. Ports are numbered sequentially starting with port 0.

Description

This command uploads a file from the router using *Trivial File Transfer Protocol* TFTP or ZMODEM. Any parameters not specified use the default values set with the SET LOADER command on page 1-83. Some parameters are invalid or have different meanings depending on the method used to download the file.

The FILE parameter specifies the name of the file on the router's file subsystem and should be a fully qualified file name, including the device name. The FILE parameter is required unless it has been set with the SET LOADER command on page 1-83.

The METHOD parameter specifies the method to use when uploading the file. If TFTP is specified, TFTP is used to upload the file. If METHOD is TFTP, the FILE and SERVER parameters are required, unless they have been set with the SET LOADER command on page 1-83. If ZMODEM is specified, the ZMODEM protocol is used to upload the file. If ZMODEM is specified, the port parameter must also be specified, unless it has been set with the SET LOADER command on page 1-83. Only text files can be uploaded with METHOD set to ZMODEM. The PORT parameter is not used when METHOD is set to TFTP. The default is TFTP.

The PORT parameter specifies the asynchronous port that the file will be uploaded from, when the METHOD parameter is set to ZMODEM. If METHOD is set to ZMODEM, the PORT parameter is required unless it has been set with the SET LOADER command on page 1-83.

The SERVER parameter specifies the IP address or the host name (a fully qualified domain name) of the TFTP server to which the file is uploaded. If a host name is specified, a DNS lookup is used to translate this to an IP address. See the SET IP NAMESERVER command on page 8-118 of *Chapter 8, Internet Protocol (IP)* for more information about setting up name servers. The PING command on page 8-103 of *Chapter 8, Internet Protocol (IP)* can be used to verify that the router can communicate with the server via IP. The SERVER parameter is required if METHOD is TFTP, unless it has been set by the SET LOADER command on page 1-83. The SERVER parameter is not used when METHOD is ZMODEM.

For security reasons this command will only be accepted if the user has SECURITY OFFICER privilege.

Examples To upload the file SHOW.SCP stored in FLASH memory to a TFTP server with an IP address of 172.16.8.5, use the command:

```
UPLOAD FILE=SHOW.SCP SERVER=172.16.8.5
```

See Also LOAD
SET LOADER
SHOW FILE
SHOW LOADER